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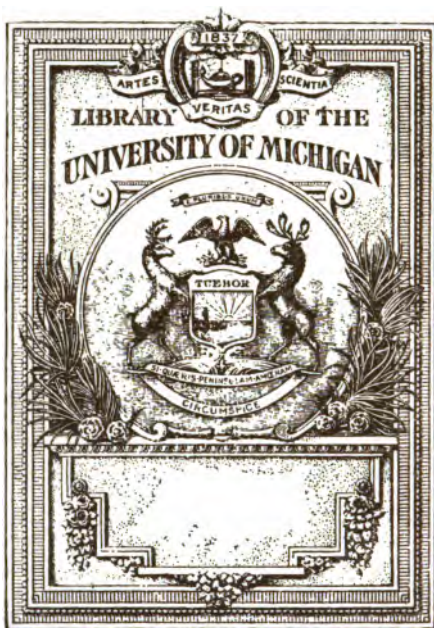
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DENTAL NEEDS AND DENTAL FACILITIES

WITH SPECIAL REFERENCE TO A DENTAL
PROGRAM FOR CHICAGO

BY

MICHAEL M. ^{Ys}DAVIS, JR., PH. D.

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AMERICAN HOSPITAL ASSOCIATION

ASSISTED BY

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CHICAGO

1922

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4-9-1923

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FOREWORD

As stated in the opening paragraph, page IX, this survey was conducted by the undersigned, at the request of Mr. Julius Rosenwald of Chicago, under the auspices of the Service Bureau on Dispensaries and Community Relations of Hospitals of the American Hospital Association. The material was gathered during the months of February, March and April in 1921. The style in which it is presented is influenced by the fact that it was a report of a survey rather than a formal treatise on the subject. In preparing the report for publication, the original form has not been changed except by a few slight verbal alterations, and no attempt has been made to revise the subject matter up to date.

MICHAEL M. DAVIS, JR.

New York City
March 1, 1922

INTRODUCTION

Recognizing the great importance of adequate dental
tion of health, particularly among
Rosenwald conceived the idea that
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rested the author to make the study.
rvey has included intensive studies
as provided for the public in the cities
ester, which among the large com-
untry can show the most advanced
what less intensive studies have been
(Connecticut), New York, Detroit,
hia, and in Chicago; correspondence
undred thousand population or over
aller communities in which dental
to be especially developed has been
ervice in a selected number of leading
aries has been studied; interviews
entists, health officers, educators
and others, have been held. Examination has been made
of the literature on the subject of dental care in its com-
munity relations and a number of selected titles are
included in the bibliography.

The list of obligations would be a long one.
Grateful acknowledgment is made to Miss Mary C.

Jarrett of Boston, for her intelligent and efficient assistance in the study of the community relationships of dental institutions and services, and in analyzing and assembling material; as well as to Miss Josephine Colegrove for assiduous secretarial aid. The study would have been impossible without the advice of many professional men, among whom mention must be made of Dr. Thaddeus P. Hyatt, Dr. Alfred C. Fones, Dr. Arthur D. Black, Dr. Harvey J. Burkhart, Dr. Harold DeWitt Cross, and Mr. Abraham Flexner.

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COMMUNITY DENTAL SERVICE

CHAPTER I

KINDS OF DENTAL SERVICES

To a large number of persons, dental care still means nothing more than the relief of pain and the preservation of the chewing apparatus. This is true even among many dentists themselves, as well as among the lay public.

Dentistry a Branch of Medicine. Only very gradually has a new conception spread. The dentist has been thought of as the mechanic of the mouth. An entirely different conception is necessary for any adequate understanding of the dental needs of a community and of the ways of meeting them. Dentistry as a recognized profession is about a century old; dentistry in its modern conception is hardly a generation old. Within this brief recent period the connections between dental trouble and disease have been so developed as to transform the conception of dentistry from a kind of mouth mechanics to a branch of medicine. This transformation in point of view has been brought about by the convergence of a number of forces. The discovery that a number of constitutional diseases may be caused by root abscesses has aroused among medical men an unprecedented interest in the care of the teeth. The development of X-ray technique has provided a tool whereby the condition of

the teeth and the presence or absence of foci of infection may be determined with an accuracy formerly unthought of. The prompt and sometimes dramatic cures of rheumatism, of heart disease, and of other serious or painful afflictions, as a result of treatment of the teeth, have aroused active interest among the laity. The relation of bodily nutrition to the growth and decay of the teeth has been studied in recent years by students of dietetics and metabolism and by medical men, and has further emphasized in the minds of leading dentists and physicians the medical relations between mouth conditions and general physiology.

Again, from another angle, medical inspection in public schools, as it has become more widespread in recent years, has revealed a startling amount of dental defects. Still more recently the examinations made for the military draft stirred the country by their revelations of the great prevalence of many physical defects, particularly of the teeth.

Finally, actual demonstrations made by a few public spirited dentists and health workers, notably Dr. Alfred C. Fones of Bridgeport, of the benefits of dental prophylaxis among children, have convinced a certain proportion of the dental and medical professions and a certain section of the general public, that practical accomplishments are possible for a not unreasonable expense.

With the advance in the preventive idea in dentistry, more and more effort has been made to reach children of the younger ages. So far as adults are concerned, the public has become more receptive to the idea of preventive dentistry, because modern discoveries in local anaesthesia have made dentistry almost painless, and because infection at the roots of the teeth has been

demonstrated as a cause of ill-health. Fear of pain has been removed and at the same time a popular conviction has dawned that bad teeth may cause illness.

The dental and medical professions have been brought much closer together by the discovery of the relation between oral sepsis and systemic disease. The interest of the physician in dentistry has been greatly stimulated for this reason. On the other hand, the dentist's interest in medicine has been enhanced by his growing realization of the significance of mal-nutrition as a cause of dental disease.

Dental Needs of Children. Children and adults present different problems in dentistry because of differences in the kind of dental work required and also in the means for getting it done. With children the emphasis is upon prevention, upon cleanliness, nutrition, and the formation of habits of oral hygiene, and all treatment of dental diseases should be subsidiary to this main purpose. With adults dental work must be largely curative, consisting in repairing or replacing diseased teeth, relief of pain, and removal of infections that cause systemic troubles. Oral hygiene has value, of course, for the adult, and its benefits have been effectively demonstrated; but it is of paramount importance to the health of the child during the years of growth. If the teeth are kept in order up to the age of twenty-five, and habits of dental hygiene are established, there is likely to be little serious trouble from them throughout adult life.

There is considerable diversity of opinion among members of the dental profession as to the frequency of various forms of dental disease and defect, the relative frequency and weight of various causes in the production of dental disorders, the best methods of dealing with

community needs in dentistry, and the amount of time required for the different types of treatment. However, there is substantial agreement upon the main issues of the problem of mouth hygiene in relation to public health, which has been tersely stated recently * by Dr. Edwin N. Kent, Supervisor of Mouth Hygiene, Massachusetts Department of Public Health, as follows:

Dental Disease and General Health.

"1. Dental caries (tooth decay) is the most prevalent of all human diseases, being found in a progressing stage in the mouths of at least 95 per cent of our school children.

2. Deleterious systemic effects from this almost universal disease come about mainly through the three local results immediately following its ravages:—

(a) A crippled chewing machine, with its working tools wholly or partially destroyed, cannot do the work for which it was intended. The first act of digestion is many times entirely eliminated.

(b) Cavity pockets in the extensively decayed teeth found in the mouths of a large percentage of our school children form ideal incubators for the proliferation of bacteria, many millions of which are hatched, mixed with food, and swallowed daily.

(c) The abscesses appearing at the end of tooth roots, following death of the pulps, resulting from extensive caries, may cause rheumatism, endocarditis, neuritis, nephritis, arteriosclerosis and other serious systemic disturbances.

3. Eighty per cent of all dental disease may be prevented by proper home care of the mouth and regular operative treatment by a dental practitioner who understands and follows the principles of preventive dentistry.

4. Ninety per cent of our school children do not use a tooth-brush daily, and many of these are not financially able to obtain necessary professional treatment."

* Mass. Dept. of Public Health Monthly bulletin, The Commonwealth, Sept.-Oct. '20. Mouth Hygiene Number.



Cleaning Children's Teeth. (a) The first step in dental work for children is cleaning the teeth. Practically every child needs to have its teeth thoroughly cleaned and polished periodically by a dentist or dental hygienist. Nine-tenths of the children in our schools do not brush their teeth daily, and therefore need this initial treatment badly. An unclean mouth helps to produce dental caries and provides soil for harmful bacteria. Even with proper daily brushing, the teeth require this prophylactic cleaning at intervals. Dentists have different opinions as to how often it should be done. Some say four or six times a year (Hyatt). Others say that after the initial cleaning, with proper diet and care, later cleanings are relatively unimportant (Kent); and that one cleaning a year given to all the children of a grade would be worth more than two cleanings a year for half the number (Cross). The most prevalent opinion seems to be that two cleanings a year are required (Black, Burkhart, Fones).

These prophylactic cleanings are now usually given to children for the first time when they reach school; but they should begin when the child reaches the age of three years. The Forsyth Infirmary set aside a week recently for the Baby Hygiene Association of Boston to bring young children. In Rochester, parents are encouraged to bring children of pre-school age to the Dental Dispensary.

Extracting, Filling, Treating. (b) Cleaning the teeth alone is not enough, for 75 to 95 per cent of school children have dental caries. The diseased teeth must be extracted, filled, or treated. Children of the first five grades in Bridgeport, when the dental work began there, were found to average seven cavities each. It is estimated that 20 per cent of all the teeth of school children are in a state of decay. These decayed teeth are the cause of poor

mastication, abnormal growth of the jaw from improper chewing, tooth-ache, infection from the bacteria bred in the mouth and swallowed, and greater liability to disease. As a rule only about a third of public school children are found ever to have been to a dentist.

About one child in a hundred in the ordinary school will have an ulcerated tooth, indicating a condition of infection at the root of the tooth that may cause serious injury to the general health, rheumatism, or heart disease.

Relations of these Services. The relative amounts of the three kinds of corrective work above mentioned (extracting, filling, and treating) are found to vary within fairly wide limits, depending in the first place upon the dental policy which is followed, and in the second place, on the degree to which the children's teeth have been previously neglected. For example, as regards extracting, at the Forsyth Infirmary the number of fillings in one year was over two and a half times the number of extractions. The same ratio is found at the Rochester Dental Dispensary. In the New York City school clinics for the last two years there have been many more extractions than fillings. The figures of the experimental clinics conducted by the Association for Improving the Condition of the Poor in a district of New York show in two months nine times as many fillings as extractions.

Prophylactic treatments have come into use for the prevention of caries, such as a little silver nitrate put into fissures that are likely to develop decay. Treatments to remove the tooth pulp (or nerve), if it has been injured, are more or less frequent according to the judgment of the dentist as to whether it is expedient to extract or to treat the tooth. Some dentists consider that more benefit can be secured to a greater number of children by extrac-

tions, which take relatively little time, than by treatments, which are time consuming. The necessary treatments these men would say, amount to less than half as many operations as filling and extracting. As an illustration of variations in dental policy in this matter, it was found that at the Rochester Dispensary in one year the treatments given were one and one-half times as many as the fillings plus the extractions, while at the Forsyth Infirmary there were only one-sixth as many treatments in a year as fillings and extractions together.

Orthodontia. (c) Irregular development of the teeth presents a large problem to the dentist. The normal arrangement of the teeth may be interfered with by a number of causes, among which are prenatal growths affected by poor condition of the mother; lack of proper nutrition in infancy; habits of mouth breathing and thumb sucking. Any lack of the nourishment necessary to the growth of the teeth, or of vitality to give the jaws the exercise they require, may cause irregular teeth.

The extent of this defect and the degree to which it impairs health is a matter upon which varying opinions are at present found among dentists.

A special branch of dentistry, orthodontia, has been developed to deal with these conditions. The general practitioner in dentistry is apt to think that the orthodontist overrates these troubles, but all dentists recognize that numerous orthodontic defects may cause serious injury to health. One estimate puts it that 80 per cent of American children have crooked teeth (Delabarre). Another is that 80 per cent would be benefited by treatment while 35 per cent require it to prevent serious impairment of physical development (Waugh). In Detroit among about 48,895 school children examined,

2,478 were reported to need orthodontia. An examination of 500 children in a school where all the children had received dental treatment not later than the third grade showed only two serious cases of orthodontia (Cross).

The causes of irregularity can be detected by a skilled dentist before disturbance of the arrangement of the teeth is noticed. It would therefore be desirable that every child be seen not later than the age of five by a dentist with some training in orthodontia. It is believed that a very large proportion of these defects could be prevented by the present knowledge of the dental profession if the defects were discovered early.

The consequences of irregular teeth are inefficient chewing, leading to difficulties of digestion and nutrition; greater liability to decay among the irregular teeth, as it is more difficult to keep them clean; often pyorrhea, resulting from the over-use of some of the teeth; impacted teeth bound in the jaw. The specialists believe that the mental attitude and capacity of the child are seriously affected by crooked teeth. If the teeth are not growing in their normal positions, there is a slight nervous irritation, too slight to be distinguished as pain, but so constant that it finally produces a nervous strain, which may appear as irritability, restlessness, St. Vitus dance, or even more serious mental disorders.

The treatment of the child for any considerable orthodontic defect requires an average of thirty hours a year for two or three years by a trained specialist (Vaughn). If properly done, the child will not suffer pain from the treatment.

Oral Surgery. (d) Surgical treatment is required for a variety of conditions that occur in children, and should receive attention in early life. This includes operation

upon adenoids and tonsils, deviated septum, cleft palate, hare-lip, necrosia, osteomyelitis, and tumors of the jaw. At the Forsyth in a year among 23,881 children, there were 57 cases of oral surgery (requiring 273 treatments), exclusive of the tonsil and adenoid operations.

The extent of the need for tonsil and adenoid operations is a matter under investigation in a number of places at the present time, and will be discussed at some length elsewhere in this report. The subject is not essentially a part of dentistry, but the condition of the nose and throat is closely related to the care of the teeth.

Preventive Dentistry. (e) Prevention of dental disease depends upon two factors, cleanliness and nutrition. The relative importance of these two measures is a matter of debate, and present knowledge of the cause of weak or decayed teeth is not sufficient to make a definite statement. The growth of the teeth is only one phase of the growth of the child's body. The teeth require special nutritive elements, and there can be no doubt that there is a close general connection between the condition of the teeth and their rate of decay, with the general nutrition of the child. The question is not one of the existence of the connection, but of its degree, and of the specific factors that are involved.

For example, one specialist estimates 95 per cent of the problem to be a matter of nutrition and 5 per cent of hygiene (Howe). Since bacteria reappear in the mouth five minutes after asepsis, the lowered resistance to the tooth to infection is regarded as the primary cause of dental disease (Cross). Another dentist believes that 70 to 80 per cent of dental caries will be prevented through a systematic program of oral hygiene in the public schools. Still another view holds that hygiene without opportunity

for fillings in a dental clinic is not of great value and that the dental clinic should come first and the training in oral hygiene second.

Dr. Percy Howe, head of the Research Department at the Forsyth Infirmary, has made a study of the growth and decay of teeth in guinea pigs, which leads him to the opinion above noted. He has come to at least the tentative conclusion that food is the determining factor in tooth growth and tooth decay, and moreover, that the essential point is the presence or absence of certain vitamins in the food. He is now at work endeavoring to test this conclusion, and to ascertain the particular vitamin or vitamins which are most concerned. In this view, there may be an ample supply of necessary chemical elements for tooth growth, but without sufficient supply of the necessary vitamin or vitamins, the body does not make use of the available food material for tooth building.

Another element is the mechanical effect of food, manifested first by the exercise given the jaws in chewing, and second by the cleansing effects of the coarser foods upon the teeth. Certain kinds of food promote this automatic cleansing, and also require chewing. Some foods promote a free flow of saliva, which helps chemically in dental prophylaxis. Whole wheat bread and hard biscuits, for instance, serve both the purpose of affording mineral constituents and also of exercising and cleansing the teeth. Fruit after the meal, particularly the apple, affords one of the best natural methods of keeping the teeth clean.

Dental Decay and Nutrition. There is much discussion among dentists and physicians interested in this subject as to the degree to which sugar can be held responsible for tooth decay. Many hold sugar to be one of the chief

factors. According to Dr. Howe's present belief, sugar is of little direct influence in promoting caries, although the eating of large quantities of sugar is likely to mean deficiency in tooth forming elements in the diet, so that decay results indirectly from the sugar.

The great importance of the character of the food upon the teeth seems conclusively proved by the healthy teeth of savage and semi-savage peoples. Among 18 children of a savage tribe in the Philippines,* a typical sample, 89 per cent of the teeth were sound, and in another barbarian tribe 93 per cent of the teeth of the children were sound. Italian children of the rural districts brought up on coarse foods and little sugar arrive in this country with clean strong teeth, which very soon break down with the new diet.

The prevention of dental disease among children should begin with prenatal care. Insufficient and improper nourishment of the mother during pregnancy is particularly bad for her teeth, and if the mother's teeth are diseased, the development of the child may be interfered with. The movement for prenatal care should give attention to this dental aspect.

Perhaps the question of the relative influence of mechanical cleanliness and of bodily nutrition is one more academic than practical, for both mechanical cleanliness of the teeth and good nutrition are obviously desirable. Preventive dentistry for children should clearly include all aspects,—(1) the cleaning of the teeth, (2) instruction of the child in mouth hygiene, (3) instruction of the child (and the parent) as to diet, (4) attention to general hygiene.

*"Oral Hygiene and Public Dental Service in the Philippine Islands." Louis Ottogy. Transactions of 6th International Dental Congress, 1914.

The dental needs of children may be summarized according to the following procedure. The first three items cover the preventive aspect.

1. Periodic dental inspection.

The child should be seen by a dentist at the age of two and twice a year thereafter. The first teeth, so commonly neglected on the ground that they are not permanent, are in reality of the greatest importance, for nutrition is more easily disturbed and has a more serious effect on development in early childhood than at any time later.

The first permanent teeth, the six year molars, should receive particular attention, as they are the main reliance for chewing. Early neglect of the teeth causes the loss of a large percentage of first molars. The Public Health Service reports 25.8 per cent of over 7,000 children examined and had lost one or more; and among over 6,000 children from 6 to 17 years, of the six year old children 14.3 per cent had carious first molars; of those 11 years old, 54 per cent, and of those 16 years old, 58.7 per cent had molars either carious or missing.*

School inspection of children's teeth should wherever possible be made by dentists.

2. Systematic Instruction. This should be given to the child, and certain phases must extend to the parents. It must take three forms:

A. *Instruction in mouth hygiene*, including tooth brush drills. The most important means of education in mouth hygiene is the personal talk of the dentist or dental hygienist with the child. It has been said that 75 per cent of the value of the prophylactic cleaning is the education that the child receives in the care of its teeth. Time must be allowed for this important part of the operation. Talks to groups of children and tooth brush drills in the schoolroom are important, and may be conducted by teachers, school nurses, or dental hygienists. To the older children, stereopticon lectures have been used successfully. Literature and lectures for parents are a great help. The personal instruc-

*"The Fate of the First Molar." Harry B. Butler. U. S. Public Health Service Reports, March 4, 1921.

tion in the children's home by school nurses, public health nurses, and visiting teachers is a large factor in educating parents.

B. *Instruction in diet.* To make this effective, it must often take practical as well as academic forms. The parents must often be shown how to purchase and prepare the needed foods for the child, and for the whole family. Some of this instruction to parents can be transmitted through the child, but sometimes it must be given directly to the parent by a dietitian in the home. This field of work lies outside dentistry proper, and falls within the province of the pediatric clinic or the nutrition class. Not a little of it has been taken care of in tuberculosis clinics, but by whomsoever done, its dental relations need to be understood and emphasized for the sake both of the child's teeth and of the child as a whole.

C. *Instruction in general hygiene.* This again may be given partly by the dental clinic or its agents, but obviously reaches still further beyond the special field of dentistry.

It is apparent that a completely worked out dental program must be part of the general public health program, if it is to be soundly based and broadly successful.

3. **Tooth Cleaning.** This must be done partly by the dentist and the dental hygienist in the clinic or office, and partly by the child himself with his own toothbrush at home. Of course part of the instruction in oral hygiene above mentioned is the method of using the toothbrush, but what is even more important, is the habit of making use of it at least twice a day.

4. **Dental Repairs, including so far as necessary:**

- a. Extraction
- b. Filling
- c. Treatment
- d. Orthodontia
- e. Related medical and surgical work, such as the removal of diseased tonsils and adenoids, or medical or surgical treatment for other defects or diseases which have a demonstrable relation to the child's general condition and to the particular problems of its teeth.

Dental Needs of Adults. Ideally, if present scientific knowledge could be completely applied and complete dental care and all known preventive measures be provided for a population from earliest childhood up, the dental needs of children and adults would be nearly the same. There would of course be greater emphasis among children upon the educational, dietetic, and orthodontic features. From the practical standpoint, however, the dental problem now presented by the adult differs sharply from that of the child, to a degree that is more than difference of emphasis. The adult generally comes to the dentist with serious dental defects already developed. The need of repair is usually so urgent that it dominates the dental situation. The outstanding immediate need mostly leads to dental repair rather than prevention.

The filling of cavities is essential to health, and it is estimated that adults have on an average five cavities each to be filled. The filling of small cavities would prevent much of the decay that later results in extraction. On the other hand many extractions are made necessary by the improper filling of cavities that have gone far in decay.

The recent studies of the relation of abscesses at the roots of the teeth to various bodily diseases has increased the demand for extractions. The amount of dental service required for adults whose teeth have been neglected in the way of filling and extracting only (without considering for the moment the substitution of artificial teeth and oral surgery) is of overwhelming volume. One hundred per cent of adults need dental care. In the British Army in a new draft, 6.5 operations were required per man. In the South African war 2,450 men were invalided home for dental disease at a cost of £100,000.

Mention has already been made of the special need of dental care for pregnant women. The British Royal Commission on Dentistry* stresses the importance of dental care for expectant and nursing mothers, saying that they should "perhaps more than any other section of the community" have their teeth put in good condition.

Curative Work for Adults. Crown, bridge, and plate work is needed to some extent by nearly 100 per cent of the adult population. The restoration of partly destroyed teeth and the replacement of extracted teeth is desirable in practically every adult case; but it is a question how necessary to the health it may be to restore or replace teeth, depending upon the number of teeth involved and their importance to mastication, and also upon whether their loss is disfiguring. In public health dentistry only a small part of this form of treatment would be possible because of its relative expense, and extraction would be resorted to in most cases.

A complete set of false teeth is required for a small proportion of adults, not over 2 per cent.

Oral surgery for adults, exclusive of extractions, is comparatively rare, not over one per cent requiring it. In those cases which do need it, however, it is often of the greatest importance to the patient that it be performed.

Much dental work required by adults is closely associated with medical and surgical treatment which is needed because of other diseases. Patients in hospitals for various disorders are found to have bad teeth and root infections, which may be closely connected with conditions which brought them to the hospital, and which

*Great Britain, Royal Commission on Dentistry. Report of Committee to Investigate the Practice of Dentistry, 1919. Dental Cosmos, Vol. 61, 1919, pp. 525-605.

therefore urgently need to be dealt with; or the condition of the teeth is revealed when the patient is examined in the hospital, and should be given attention even when not demonstrably connected with any systemic condition.

Patients in a dispensary or in the care of private physicians at their offices likewise manifest a wide variety of medical troubles which are connected with dental decay or other disorders of the teeth. A distinct proportion of dental work for adults now arises as result of diseases which the patient did not himself suppose had anything to do with his teeth, but which upon study by the physician in his office, the clinic, or the hospital, show their connection with mouth conditions.

CHAPTER II

DENTAL FACILITIES

Facilities for meeting dental needs may be divided into five classes:

- A. Dentists
- B. Dental Quacks
- C. Dental Hygienists
- D. Dental Schools
- E. Dental Clinics of Various Types.

A. Dentists. An estimate furnished by the National Dental Association states that there are approximately 57,000 registered dentists now in the United States, but an authoritative article by Dr. H. E. Friesell,* estimates the number in 1919 as only 44,000, which would make the number today, 1921, only about 45,000. In 1920 there were no graduating classes in the dental colleges of the country because in that year the length of the course was changed from three to four years. In 1923 it is estimated that there will actually be 800 less dentists in the United States than in 1920, owing to higher standards for entrance requirements now being introduced in the dental schools. The combination of a reduction of students due to the war and the further reduction due to the lengthening of the course has created a particularly serious scarcity of dentists at the present time. It is difficult for the dental infirmaries to keep their staffs up to full strength.

*Journal of American Medical Association, Vol. 75, No. 19, November 6, 1920, page 1247.

It will be observed that the present number of dentists in the United States in proportion to population is about one dentist to 2,400 persons. The proportion to population among different states varies widely. Figures dating from 1917 show that there was the following proportion of dentists to population in a few typical states.

STATE	DENTIST	TO POPULATION
California	1	1296
Massachusetts	1	1346
Illinois	1	1614
Connecticut	1	1650
Iowa	1	1765
Wisconsin	1	1817
Kansas	1	1871
New York	1	1980
Pennsylvania	1	2194
South Dakota	1	2400
Alabama	1	3177
Texas	1	3654
South Carolina	1	3700
Virginia	1	4126

In considerable parts of the country, especially in the South, only one dentist to over 4,000 people is not infrequent.

The proportion in the city is generally larger than in the country. Thus Chicago has about one dentist to every 1,200 persons; New York about the same proportion; Boston, with a population of only 750,000 or a little more than a fourth that of Chicago, has nearly 2,000 dentists against Chicago's 2,500, but the dentists in Boston largely serve the metropolitan area with a population of about 1,500,000, so the ratio of dentists to population in greater Boston may be stated as approximately one to 800.

Dentistry has become specialized. There are a certain number of dentists who confine their work mainly or

wholly to extractions; others who do little or nothing but orthodontia. Thus there are some 375 dentists in the country now practicing orthodontia. These and other specialists are chiefly found in the larger cities.

B. Dental Quacks. The dental "parlor" is found in many small industrial communities as well as in large cities. No general study so far as known has been made of the dental quack. They correspond to the medical institute, to which considerable attention has been given in recent years by the medical profession and by public health interests, in the endeavor to limit or suppress a serious evil.

The dental "parlor" generally advertises the more profitable forms of work, such as false teeth, crown and bridge work. The letter of the law may be observed by having only licensed dentists in attendance, but over the quality of work there is no control. The spirit is wholly commercial. Reputable dentists tell of cases coming to them whose teeth have been improperly treated in the dental "parlor." Careless cleaning of a cavity before filling, for instance, means continued decay and later a larger filling to be put in and paid for, or a still more serious and expensive procedure. Undoubtedly dental "parlors" do an enormous amount of evil to the health and to the pocketbook of thousands of adults of limited means. With the existing shortage of dental service and the ignorance of the lay public as to dental standards, it is difficult to see how to control this evil, except by offering adequate public facilities in competition with them.

The existence of dental "parlors" has little bearing upon dental work for children, since preventive work is not profitable enough to make it worth while for the advertising dentist to give it his attention, but the

knowledge that dental quacks are active should increase the desire of every public spirited person to see more adequate dental facilities of high grade provided for the adult population as well as for children.

C. Dental Hygienists. Legislation providing for licensing of dental hygienists has been passed in twelve states,—Alabama, Colorado, Connecticut, Iowa, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Oklahoma, and Tennessee. The first law of the kind was the New York law in 1916. Massachusetts and Iowa followed in 1917. Legislation for this purpose is now being sought in other states, notably Illinois, California, Pennsylvania.

The applicant for license must be a woman, in eight states, while in four sex is not specified in the law.

The required age for the practicing dental hygienist is twenty years or over in all states, except Iowa, Maine and Oklahoma, where it is eighteen. A training course in oral hygiene, at an acceptable school, is required in all states; but in Massachusetts, Minnesota and New Hampshire a trained nurse with three months clinical work in a school for dental hygienists may also be accepted, and in Maine six months training with a dentist is accepted. New Hampshire, Minnesota and Iowa made provision for licensing women who had had one, three and five years respectively of practical experience in dental hygiene under the direction of a licensed dentist, if they passed the state examination within one year after the passage of the law.

The general educational requirement varies from one or two years of high school to a full high school course (required in Michigan and Minnesota); while in Massachusetts and Oklahoma no educational requirement is

specified. The length of the training course is required to be one academic year, except in Minnesota, where it must be a two-year course.

The requirements are highest in Minnesota, being a brief school course followed by two years of special training.

The required examination is given in all states by the board of dental examiners, and the nature of it is left to their judgment, except in Connecticut, where the examination is to consist of (1) a practical test on a patient of cleaning and instruction, (2) an oral inquiry by the examiner, and (3) a written examination in anatomy, physiology, dental histology, bacteriology and sterilization, dental caries, malocclusion, and oral prophylaxis.

The registration fee ranges from \$5 to \$25. Five states,—Alabama, Maine, Massachusetts, Michigan, Minnesota, provide for yearly registration, with a fee of \$0.50 or \$1.00; and Massachusetts requires re-registration on change of place of employment.

The dental hygienist is permitted only to remove deposits and stains from the exposed surfaces of the teeth (and in a few instances, beneath the free margin of the gum). She may be employed in most states in public institutions, in schools, and in offices of licensed dentists; but New Hampshire permits her to work only in schools and institutions, and Oklahoma and Tennessee only in dentists' offices.

In all states the work must be done under direction of a licensed dentist. In most of the laws, provision is made for revoking the license of either dentist or dental hygienist who violate the conditions of the act.

In most states any recognized dental infirmary may establish a training school for dental hygienists. In some

states the law makes no specifications regarding training courses. In Michigan the dental examining board is given power to determine what constitutes an acceptable course.

Three training schools for dental hygienists have so far been established,—at the Forsyth Dental Infirmary, Boston, 1916; at the Rochester Dental Dispensary, Rochester, 1916; and at Columbia University, New York, 1916. In Bridgeport, Connecticut, a training course was given under the auspices of the Board of Health, in 1913, for the special purpose of fitting a staff of dental hygienists to work in the city's public schools. Training courses for dental hygienists are under consideration at Northwestern University, Chicago; University of Michigan, University of Minnesota, University of Pennsylvania, University of California, and Colorado University. The admission requirements at Columbia are eighteen years of age and four years of high school or its equivalent; at Rochester Dispensary, twenty years of age and one year of high school; at Forsyth Infirmary, nineteen years of age and four years of high school or its equivalent.

The length of the course at the Forsyth Infirmary is twelve months, at the Rochester Dispensary and at Columbia University it is about eight months. In all three schools the time is divided about equally between theoretical instruction and practical work. The courses of study are similar in all schools, including anatomy, physiology, chemistry, bacteriology and sterilization, dental histology and pathology, oral prophylaxis, dietetics and nutrition.

The dental hygienist has two functions of equal importance, (1) the giving of prophylactic treatments, and (2) the teaching of oral hygiene. The educational part of

her work involves personal instruction to the children when she gives them treatments, and instruction to groups through talks and toothbrush drills.* She should not be confused with the dental nurse; for she has not received training in the care of the sick. On the other hand the dental nurse who assists the dentist in clinical and surgical work is not ordinarily trained to give prophylactic treatment or oral hygiene instruction. Occasionally a dental nurse is trained under the direction of a dentist to perform the functions of a dental hygienist.

The total number of graduates from all existing schools is about 470 (Forsyth, 99; Rochester, 159; Columbia, 200; Bridgeport, 13). The total number of students in this year's classes is 136.

There is considerable apprehension that the dental hygienists will be absorbed as quickly as they are graduated into the offices of private dentists, as the majority have been so far. By employing a dental hygienist on salary, a dentist adds to his capacity for work; and the question is under discussion whether he is justified in receiving fees for work done by an assistant. The argument is that the hygienist does her work better than the dentist himself would do it, that she is not merely assisting him but is contributing professional service to the treatment of the patient.

It may be mentioned that in England it is proposed to have dental "dressers." At the Chesterfield School Dental Clinic in London, they extract teeth, do dressings with silver nitrate, and do fillings. The British Dental Association in 1917 recommended the training of nurses for dental examinations including the making of mouth charts.

*For certain limitations to be exercised in this connection, see page 103.

Thus in England as well as in this country, the necessity for providing assistants to the dentists has been recognized, and a practical movement is under way.

D. Dental Schools. Prior to the establishment of the first dental school, in 1840, dental training could be obtained only in the office of a preceptor, and for many years thereafter, until all sections of the country were fairly well provided with schools, this method of studying dentistry existed. The United States Census Bureau's published statistics show that in 1902 there were 26,142 practicing dentists in the country, and of that number, only 16,831 were graduates of dental schools. Eventually, however, all the states adopted dental laws, requiring a college education to practice dentistry, and state boards of dental examiners were appointed in all states to pass upon the qualifications of graduates who applied for licensure.*

The dental course has been continually lengthened and strengthened. Lecture courses of four or five months have disappeared and a four year course with a constantly rising entrance standard is now general. The Dental Educational Council of America, organized in 1909, has had great influence in advancing dental standards. Doctor Friesell says, "The gradual development and enlargement of the dental curriculum, always more closely approaching that of medicine in many subjects; the advancement of the entrance requirements, and the general supervision of dental education by the profession as represented in the Dental Educational Council, will eventually bring dental education to a point at which the foundation training will be practically the same as that of medicine."

*Quoted from Friesell, *op. cit.*

The increase in the number of graduates of dental schools is shown by the following figures:

Year 1860	266 graduates
“ 1890	943 “
“ 1900	2,029 “
“ 1907	1,754 “
“ 1919	3,597 “

Enrollment for the academic year 1920 at the 46 dental schools was 9,302, the schools varying in size from one of 13 to one of 540 students.

Quoting again from Doctor Friesell, “In view of the astonishing increase in the demand for dentists that has arisen during recent years, the existing dental schools will be taxed far beyond their normal capacity to meet such demand, and established universities in logical centers should recognize the necessity for providing adequate dental education for the communities they now serve in other fields of education.

“An increase in the number and available capacity of dental schools of good standing is of the most fundamental importance in the improvement of dental facilities for the people of the United States, and a most worthy subject for assistance by public authorities or private individuals.”

A dental school maintains a dental infirmary for the practice work of its students. Ordinarily all kinds of dental work are done. In many schools orthodontia is done only for a few demonstration cases, enough to teach the principles of this specialty, but not to fit a student to practice it.

Preparation for orthodontia is coming to be regarded as a post-graduate course. There is no satisfactory course at the present time to prepare a dentist to practice orthodontia. Some post-graduate courses are offered, and some dental colleges give this training to their students.

A number of dental colleges send their students to work in other clinics. Tufts Dental School has developed this practice to an unusual extent. Squads of six students are sent to the Boston Dispensary and the Roxbury Dispensary for periods of one or two weeks; and a clinic of ten chairs has been established at the School for the Feeble-minded, operated by an instructor and students. The instructor is a member of the school faculty in each instance.

E. Dental Clinics of Various Types. Dental clinics have been developed in four relations:

1. In connection with dental colleges
2. In connection with hospitals and dispensaries
3. In connection with industrial or commercial establishments
4. As public health clinics:
 - a. Public school
 - b. Independent local clinics
 - c. Dental institutions founded as part of a community dental program

These four types must be discussed separately, as a basis of understanding the facilities surveyed in various cities and the elements of a community dental program.

1. *The dental infirmary* (of the dental college) has had a limited range of community service. The demands of dental practice have largely been for curative work, and the service of the dental infirmary connected with the dental college had been primarily to give the student opportunities for practice in various forms of curative work, chiefly in adults.

A certain proportion of dental colleges and the dental infirmaries attached to them have been commercial in nature, and still others, while not commercial, have made

themselves self-supporting or more than self-supporting, by charging fees. Charging fees is by no means an indictment of a dental infirmary, as there are many reasons why fees should be charged, and there are good reasons for having such institutions wholly or largely self-supporting. The point is that in the past the kind of work that has been regarded of value in teaching dental students has not been to any large extent work with children nor preventive dentistry of any kind. Those responsible for shaping the policy and for the management of a dental infirmary connected with a dental school must necessarily endeavor to furnish the dental student with that kind of practical experience which will equip him technically to be a successful practitioner of dentistry. To make the equipment and staff of a dental infirmary and the time of the dental student serve the community demands is only legitimate from the standpoint of the dental school in so far as community demands are consistent with the immediate educational demands. Only as the character of dental practice itself changes and it is generally recognized as worth while for the student to have a larger proportion of work in preventive dentistry and a larger proportion of work with children, can the dental infirmary connected with the dental college play an important part in a community dental program.

Considerable steps in this direction have been taken by a certain number of leading dental colleges of this country, and the advancement of dental education is proceeding in this direction. Yet it is essential to bear in mind that the clinics which the dental school needs cannot be made the primary basis of the community dental program. The community interests and the dental educational interests are not identical; they are not

fundamentally in conflict yet they pull in somewhat different directions. Affiliation between dental education and the community dental program is essential, as will be brought out later, but not identification either of practical facilities or of control.

2. *Dental Service in Hospitals and Dispensaries.* The growing recognition of the connection between dentistry and medicine has been manifested in many ways, among them the increase in dental service in general hospitals and dispensaries. Dental work or dental diagnosis in the general hospital was practically unknown a few years ago.

Inquiries were sent during the course of this survey to 282 general hospitals, including almost all those in the United States of 100 beds or over. 144 replies, or 51 per cent, were received, a rather high average of replies to questionnaires of this sort.

The following questions were asked:

1. Do you have a dental service in connection with your hospital?

2. If so, is this a dental service with rank as a hospital department and ward beds assigned, or is it merely diagnostic in character?

3. Is there also a dental clinic in your out-patient department, in which treatments are given, and if so, what is the size and scope of such clinic?

4. Do you feel the need of a dental service, either therapeutic or diagnostic, in your hospital or your out-patient department, if you have not already developed it, and what policy do you think a hospital should pursue in this matter?

Eighty-nine of the 144 replies reported dental services in the hospital; in four more a dental service was in the process of establishment; in twelve more it was being planned, and in two more it was hoped for. Thus dental service was either definitely established or well under way

in more than one-third of the 282 larger general hospitals of the United States.

In 46 of these hospitals, dental service is recognized as of departmental rank, with assigned beds in some instances and in others with use of beds as needed. In 32 of the 89, dental service is not recognized as a department, but is organized for purposes of consultation and diagnosis. In eleven of the 89 hospitals, dental work includes offering dental treatment to patients but is not recognized as a general department of the hospital.

Of the 89 hospitals with dental service, 41 maintained dental work for their ward patients, but had no general dental clinic. Seventeen of the 89 hospitals had no dispensary clinics of any kind, but of the remaining 72 which had some out-patient department, 48 had a dental clinic as part thereof.

Most of these clinics were for dental treatment as well as for diagnosis, only five being limited to diagnosis only.

The great pressure for dental service is illustrated by the fact that a large number of these hospitals have found it necessary to limit their dental clinic for the use of patients referred from other parts of the hospital or dispensary. Examples will appear on pages 45 and 60.

From the answers to the general questions of our inquiry, it may be said that all the leading hospitals, as reported by their superintendents, recognized the desirability of dental service. The only question that existed was as to the details of its organization and the extent to which dental work should be carried out, owing to the expense and to the risk that the hospital or dispensary would be swamped if a dental clinic were opened up for general community purposes.

On the basis of this survey and of studies of dental work

in various hospitals made in connection with other surveys, certain points or principles might well be set down as contributory toward the community dental program formulated in the final section of this report. These are stated in appendix B.

3. *Industrial plants*, coming to a realization of the importance of sound teeth to health and efficiency, have in many instances installed a dental clinic. Some 72 plants in the United States are known to have taken this step. Sometimes the expense is borne entirely by the firm, and sometimes the employees pay for the cost of materials. Some firms offer only emergency treatment, and send the employee to private dentists for further care; others require the employee to have his teeth put in order and offer him the service of the clinic. The firms that have installed dental service are invariably enthusiastic about its benefits both to the health and to the self-respect of the employees.

The industrial dental clinic obviously fits in to the scheme for community dental service by assisting in providing service for adults. The extent to which industry may wisely proceed in the direction of prophylactic or reparative dental facilities is somewhat an open question. It is not wise for industry to go so far as to take from the community its due burden of providing the necessary facilities which might be used for adults as well as for children, or to make business men feel that because they are giving moral and financial support to dental clinics in their own establishments, they need not cooperate in the support of community dental services. At the present time there is little danger that the development of industrial dental clinics will interfere with the development of community dental service. There is need for both.

4. *Public Health Dental Clinics.* The dental clinic established primarily for the purpose of meeting community dental needs is a very recent development. It is important to recognize that these public health dental clinics are not merely those which have been established in public schools or in special dental institutions particularly for preventive work but largely for children, for the public interest has lead to the establishment of many dental clinics in general dispensaries and under independent auspices, mentioned later. The public health movement has taken hold of the dental clinic because of recognition that adequate dental care for the community cannot be furnished as an adjunct to private dental practice, and is in large measure a public project and must be handled by public and semi-public agencies.

Aside from such community dental service as rendered by many dental clinics which are parts of general dispensaries (e.g. clinics described on pages 44, 45, 60 in Boston and New York) the chief groups of public health clinics are as follows:

- (a) In schools
- (b) Under independent local auspices
- (c) Large institutions especially established for the sake of the community dental program

Clinics in the Schools. (a) School clinics have been tried in the United States on various plans, most frequently in the school, but sometimes in a building adjacent thereto. The plan is usually to set up a dental chair in some unoccupied space, which may be an unused room, a corner of the hall, or the principal's office, and to employ a dentist to operate three or six hours a day, with a nurse to assist him in preparing the instruments and looking after the children. Sometimes another chair is set up and

a dental hygienist is employed to clean and polish the teeth.

Another plan, followed in Rochester and Bridgeport, is to have portable dental chairs set up in the schools for the hygienists' work of prophylactic cleaning, while the dental work is done at a control institution.

School Clinics in England. The question of school dental clinics was discussed in England as early as 1885, at a meeting of the British Dental Association. In 1890 the first school clinic was established in Cambridge. Eight years later there were a number of school clinics of the poor-law schools of Great Britain, and the School Dentists Society was organized. It is significant that it is now about to amalgamate with the School Medical Officers Association. The Education Act of 1907 made medical inspection compulsory and empowered the local education authorities to provide medical treatment. From the start, dental treatment was assumed to be included, and was specially reported upon every year in the annual report of the Chief Medical Officer. Inspection stimulated the development of dental clinics.

The British Royal Commission on Dentistry in its report,* 1919, says, "The advantage of children coming under dental supervision before school age has been forced on the attention of school medical officers and dental officers by the extent of decay which has been found to exist at the first medical inspection of children after entering school." The report recommends that measures for dental care among children of this age be energetically pressed.

England has recently developed school dental clinics under the local education authorities. In 1919 there were

* Great Britain, Royal Commission on Dentistry, *op. cit.*

306 school clinics, with 239 dentists. Forty-nine of these dentists were on full time. Arrangements for treatment organized by local education authorities include not only school clinics, but traveling "dental caravans" and small centers visited by a "peripatetic" school dentist, and also various forms of contract practice in which private dentists are used. The school dental clinics are arranged to include a play room and waiting room, an operating room, and a rinsing room.

The Education Board requires that the dental work in the schools be co-ordinated with the medical work, and be under the administrative supervision of the school medical officer. In London in 1918-1919 there were reported to be 44 centers serving 90,000 school children, and several centers were also used for expectant and nursing mothers.

It is interesting to note that while the work is free in most districts of England, in some places fees are charged, 3d to 2s 6d, and in some places fees are assessed upon the parents after reports on their ability to pay.

The first school dental clinic in Germany was opened in 1902 in Strasbourg. Ten years earlier the town had made an appropriation for dental inspection. The most advanced public measures for dental care of school children are in New Zealand, where a national bureau of mouth hygiene has been established to care for the teeth of all school children at the expense of the government.

Independent Local Clinics. (b) A number of social settlements and social organizations, feeling acutely the need of their clients for dental service, particularly adults, have established small clinics in neighborhood houses or health centers, paying the cost of a dental chair and equipment, and the salary of a dentist, and giving the

service to the people of the neighborhood either free or at a small cost.

As will be seen in the surveys of Boston, New York, and elsewhere, there are a growing number of such clinics, doing, however, because of their small size and limited means an inconsiderable amount of work in comparison with the need.

Community Dental Institutions. (c) The two examples of the large institutions which have been founded as the center of a community dental program are the Forsyth Dental Infirmary in Boston, and the Rochester Dental Dispensary, which will be studied in detail later.

CHAPTER III

DENTAL FACILITIES AND DENTAL PRACTICE

The different dental needs of adults and children have very different relations to the private practice of dentistry. The dentist has been supported in the past almost entirely by corrective work, fillings, extractions, crown and bridge work, provision of false teeth, etc. The older conception of dentistry as mostly mouth mechanics and the relief of pain is still dominant among most practitioners. Preventive work has been non-remunerative, and even now, with the increased interest in preventive dentistry, preventive work does not pay in comparison with curative.

Private Practice Based on Curative Work. The time element is of very great practical importance to the dentist. The physician may spend an hour with a patient, or five minutes, and render adequate and valuable service either way, depending on the nature of the medical need. Dental work, however, either curative or preventive, involves always a mechanical element which takes a considerable and fairly definite time for each type of work, and the work cannot be hurried without the quality deteriorating. The dentist must therefore count his time carefully and charge for it. With the general shortage of dentists and the rapidly growing demand for dental service, almost all dentists have had all the work they could physically perform. The financial incentive has been entirely towards the encouragement of reparative rather than preventive work.

The expense of dental equipment has been increasing. A better type of equipment than formerly is expected in a dental office by the patients, and much more is demanded of the dentist by the advance of dental science, and of the practical arts of dentistry. The use of the X-ray alone has added a very large item of expense to dental work, although it has of course greatly increased its efficiency. One has only to see a modern well-equipped dental office and to contrast it with what was regarded as a satisfactory dental office twenty or even ten years ago to appreciate what great technical improvements have been made, also how much these have increased the expense which the dentist needs to incur before he has a really satisfactory outfit.

As a consequence of these conditions, preventive work in dentistry and in general the movement toward the development of a community dental program has not grown up to any extent as a part or adjunct of private dental practice, but has had to proceed along independent lines. It is indeed true that many public spirited dentists have led the movement, often at much personal sacrifice, and the public and community owe a debt of gratitude to these men. Yet in the main, preventive dentistry and the program for adequate community facilities have had to develop *organized* facilities. This is a fundamental point in planning a dental program for any community. It is impractical to expect that any large part of the preventive work needed can be done by dentists in private practice or in private offices. It is necessary to develop organized facilities under control of public or semi-public bodies.

The plant and expensive equipment with which the dentist is to work must be provided by this public or semi-public body. The dentist's service in general must

be paid for. Preventive dentistry in particular will only be carried on if it is thus recognized and if it is paid for out of funds of which only a part, usually only a small part will come from those who benefit from the service.

Payment of Dentists. In clinics doing medical work, it will be recalled that the physicians have as a rule given their services without financial compensation and the question is sometimes asked why the dentists have not done the same thing. There is no one reason for this difference. It may fairly be said that the work which the physician does in the clinic generally gives him some return in medical experience, and in the best organized clinics, a very substantial return. He has an opportunity to study many cases of disease, in numbers larger than he would ordinarily see in private practice within the same period, and thus to improve his technical ability. The work in dental clinics, on the other hand, is largely mechanical in nature, and is chiefly confined to kinds of work with which even the young student has been made familiar. After a comparatively short experience in the clinic, he will learn little more from what he does there. The demand for dental service in the private office and the importance of the time element in dentistry make the financial sacrifice of giving time to a clinic more real and more obvious than to most physicians. For these and probably for other reasons, dental service in clinics has, as a rule, had to be paid for, even at moderate rates. This is a reasonable and proper policy and efficient service cannot otherwise be expected in any adequate amount.

TO SUMMARIZE

1. Adequate dental facilities for a community cannot be built up on the basis of private dental practice.

2. Preventive dentistry in particular cannot be developed as part of private practice.

3. Facilities for dental work supported by public or semi-public bodies must be depended on to provide dental facilities for a considerable part of the adult population and to furnish almost all the preventive facilities needed for the children.

CHAPTER IV

DENTAL RESOURCES IN RELATION TO DENTAL NEEDS

The dental service required in proportion to population is fairly easy to estimate in relation to children, and also may be computed at least as to minimum requirements in respect to adults.

Putting the matter for the moment on the basis of work done let us assume that a dentist works six hours a day for three hundred days a year. It has been estimated on the basis of many examinations that adults average five tooth cavities each. Allowing half an hour for each tooth, a dentist would care for seven hundred and twenty patients in a year. In the British Army and also in the Regular Army of the United States, one dental officer is estimated to be required for one thousand men. It may be roughly estimated that one dentist could give treatment to one thousand adults a year, not including preventive work.

Supply of Dentists Inadequate. It will be recalled that the number of dentists in the United States is one for every twenty-four hundred people, and that only in a few large cities of the country is the total proportion as low as one per thousand. In most communities the ratio is higher than one to twenty-five hundred. It is obviously impossible for the present number of dentists to give a thorough program of care for adults whose teeth have been neglected throughout childhood. Given the present

condition of the teeth of the population of the United States as revealed by school examinations for children and by draft and industrial examinations among adults, it is obvious that at least two and a half times as many dentists as are now in the country would be necessary to give a complete service.

This fact has fundamental bearing upon community dental programs. It means that a community dental program must concentrate upon a comparatively few points of greatest significance; that the work done outside this selected area cannot be intensive or complete. Practically this means that for the sake of the children of the present day and of the adults and children of the next generation, the primary aim in a community dental program must be the children, and particularly the young children of today. The organized dental facilities for adults must limit their work to such kinds of service as will do the most good, recognizing that at the maximum, only a small fraction of the total dental needs for adults can be met.

The problem of dental service for children, therefore, is one of determining the best policy and of endeavoring then to secure the funds necessary to carry this policy out for all children. The problem for adults is that of determining the principles on which selection should be made among the various needs, so that the facilities available shall be used in the best way.

Financial Aspects—A. Adults. A very low estimate of the salary for a well-trained young dentist is \$40 a week, or about \$2000 a year. For every 100,000 of the adult population, 100 dentists would be required at a total salary of \$200,000. One hundred chairs would be needed for this work (or if the chairs could be used also for three

hours in the evening, 66 chairs would be sufficient), costing at the rate of \$250 or \$300 each (for a portable chair and equipment), between \$25,000 and \$30,000 (or if used in the evening \$16,500 to \$19,800). Materials and supplies cost about one-fourth of the amount of salaries,* about \$50,000. This would amount to a total cost for service of \$250,000 or \$2.50 per person, exclusive of building and overhead expenses. No allowance is here made for crown and bridge and plate work, or artificial teeth.

There is no satisfactory information available as to the proportion of adults who are able to pay for complete dental service. A large proportion of adults now do pay for the relief of pain and other reparative treatment, for false teeth and for crown and bridge work. To put a mouth that has been neglected for years into good condition is as a rule an expensive process, requiring an outlay which a good proportion of the population cannot meet at the rates charged by dentists who give adequate service. The work needed by adults would of course be greatly diminished if proper care had been taken of the teeth from childhood. The financial as well as the technical solution of the adult problem ultimately lies here. The experience of a number of dental infirmaries shows that a dental clinic for adults can be made self-supporting. But if any considerable amount of work were to be done for the very poor, there would be a deficit, if overhead as well as immediate running expenses had to be covered.

Financial Aspects—B. Children. Estimates of the number of children a dentist can care for vary from 50 a month (Kent) to 100 a month (Cross). Another

*Figures of Middlesex County (Mass.) Farm Bureau Dental Clinic. The Commonwealth, Mouth Hygiene Number, Vol. 7, No. 5. September-October, 1920, p. 343.

estimate allows 1,500 children a year for a dentist with the assistance of a dental hygienist. The younger the children the less work generally has to be done per child and the more children can be cared for by a given staff. Furthermore, if the children of older years have been given continuous dental attention the amount of work to be done per child is diminished and a given staff can care for a much larger number.

For the cleaning of teeth, if done by dental hygienists, one hygienist to every 2,000 school children (giving two treatments a year) seems to be an estimate that strikes an average amongst divergent opinions. The average time allowed for a cleaning varies from 15 minutes (Burkhart), twenty-five minutes (Cross), and thirty-five minutes (Black), to one hour (Hughes and Millberry). The usual salary of a dental hygienist is from \$1,200 to \$1,500 a year; so that the salaries of 50 hygienists required for 100,000 children would amount to \$60,000 to \$75,000. Supervisory salaries would bring it closer to the latter figure.

The number of dentists required for 100,000 children will vary with the conditions above mentioned, but will be somewhere between one dentist for every 1,000 to 2,000 children.

Adequate provision for 100,000 school children would therefore call for an expenditure of approximately \$325,000* for salaries and materials and \$37,500 for dental chairs.

Some dentists would have one hygienist for every dentist, others one for two dentists, while others believe it is more economical to have two hygienists for three dentists.

* \$200,000 for dentists, \$75,000 for hygienists, \$50,000 for materials.

At the Middlesex Co. (Mass.) Farm Bureau Dental Clinic* the cost of service per child is \$7 allowing $3\frac{1}{2}$ hours for each child at \$2 an hour. Their plan is to employ two dentists and one hygienist who can care for 100 children a month, 60 to 80 per cent of whom have never been to a dentist. These 100 children average 750 fillings, 100 extractions, 94 cleanings, 15 canal fillings, 200 silver nitrate treatments, totalling 1,200 operations. A year later one hour is sufficient for each child previously treated. This is a higher average of operations than is usually estimated. At the Forsyth Infirmary in 1919 the average number of operations in the dental clinic, extracting clinic, and oral hygiene department was about nine. The Middlesex clinic runs for about 90 hours a week and costs \$180 (\$120 for salaries, and \$30 for supplies and laundry, and \$30 for overhead and depreciation). The school clinics of New York City cost \$23,800 the first year and cared for 7,300 children at a cost of \$3.25 per child. The original cost of equipment is about 10 per cent of the cost of maintaining the service, so that in New York about \$3 would be the average cost of dental service per child.†

It is believed that about 50 per cent of school children require free dental service. In some communities (notably Rochester and Bridgeport) the prophylactic cleaning is given to every school child free, while parents who can afford to pay for dental work are referred to private dentists.

*Commonwealth, Mouth Hygiene Number, *op. cit.*

†It will be observed that these per capita costs are higher than those given in Rochester or Bridgeport (pages 77 and 84). The reason is partly the smaller scale of the work, and the further fact that when only a small proportion of children can be given dental care, those selected for the clinic are those who have more than average dental needs, and who therefore require more time per case.

Orthodontia for children with crooked teeth must be done by dentists trained in this specialty; therefore the cost must be computed separately. The average time required for each child is said to be 30 hours a year, over a period of two or three years (Waugh). One dentist then could care for 60 children in two or three years. The salary of the orthodontist is the same as that of other dentists, about \$2,000 a year. The materials required for orthodontia are expensive, running from \$12 to \$100 per case. At the Harvard Dental School \$12 is the average cost. At the Rochester Dispensary the average cost per operation in the orthodontia department is \$1.15. Thirty hours a year indicates 40 to 60 operations, making the cost per child for the year \$46 to \$69. The shortage of trained orthodontists, brought out elsewhere in this report will at the high cost of the work, present insuperable obstacles to enlarging this branch of service in proportion to the need.

The cost of dental work, so far as salaries are concerned, will be substantially diminished in those communities where dental students are available, since these will give their services free. It must be remembered, however, that the number of dental students in the junior and senior years is at the present time less than 2,000, and that these are located chiefly in a few large cities. Even in Chicago the number of dental students in the two later years amounts to only about 374, and while it is of great importance to link up their services with any community dental program, the total amount of work which students can do in proportion to the total needs is too small to be the major reliance for the community as a whole.

Summary of Resources in Relation to Needs. The

relation between dental resources and dental needs may be summarized as follows:

1. The number of dentists is everywhere far below the number needed.

2. The number of dental students is too small to be a large factor in the country-wide situation, although they are an important element in developing certain institutions in the relatively few communities which possess dental schools.

3. A large increase in the number of dental hygienists is an urgent need.

4. A complete dental program for adults is not practical, both because of its expense and because of lack of sufficient dental personnel.

5. A complete dental program for children is necessary, and is practicable if the work is definitely planned to concentrate on the points of greatest importance and upon the younger years, with a follow-up system.

6. This policy, if adopted, should ultimately reduce the adult dental problem to proportions manageable for the existing dental personnel, and within the financial means of patients and of the community.

7. A dental program for all children within selected age groups and within selected types of work should be determined and sought. (Page 99.)

8. A dental program for adults should be rigidly limited to certain types of service. (Page 100.)

9. The service to children must be developed upon a public semi-public basis, since private dental practice cannot be depended upon to deal with this to any considerable degree.

10. Public or semi-public dental clinics must also be largely depended on to deal with the adult dental problem, but these clinics for adults can and should be largely self-supporting.

CHAPTER V

DENTAL SERVICE IN VARIOUS CITIES

Boston. Boston has about 2,000 dentists for a population of approximately 750,000, in the politically defined city but as above mentioned, these dentists serve in considerable measure greater Boston, with about double the population. Taking into account additional dentists in the outlying regions, it is probable that there is one dentist for every 600 population, a very high ratio.

A law permitting the employment of dental hygienists under direction of registered dentists was passed in Massachusetts in 1915. Examination by the Board of Dental Examiners is required, and the applicant must be a person of good moral character, twenty years old or over, who is a graduate of a training school offering a course of not less than one academic year or a graduate nurse with three months clinical training in a school for dental hygienists.

There are a number of dental hygienists in the city, graduates of the school established by the Forsyth Dental Infirmary, in 1916, and of the Bridgeport course. The majority are employed by private dentists.

In 1920 the Forsyth-Tufts Training School for Dental Hygienists had 99 graduates, of whom 23 were in public service, two in industrial clinics, 61 with private dentists, and the remaining thirteen not employed.

This course is conducted in affiliation with Tufts Dental School. It covers twelve months and fits the pupil to teach

oral hygiene, to do prophylactic cleaning of the teeth, and to assist in dental surgical operations. The requirements for admission are good character, age not under nineteen years, and four years of high school or its equivalent.

Boston is noteworthy for the variety of its dental facilities, the chief of which is the Forsyth Dental Infirmary. There are in addition the following dental clinics:

Harvard Dental School Infirmary	120	chairs
Tufts Dental School	100	"
Roxbury Dispensary	6	"
Boston Dispensary	5	"
Maverick Dispensary	3	"
Lincoln House Dispensary	1	"
Massachusetts General Hospital	3	"
Hyde Park Health Center	1	"

239 chairs

The chair hours of service a week in these clinics total 7,601. In addition, the Massachusetts Homeopathic Hospital, Carney Hospital and the Children's Hospital maintain small dental clinics for their own cases. The Massachusetts General Hospital clinic is also limited to the patients of its out-patient department. In the Homeopathic Hospital, a beginning has been made in having dental hygienists from the Forsyth School clean the teeth of ward patients.

Certain points of interest may be noted. The clinics such as the Boston Dispensary, the Maverick Dispensary, and the Roxbury Dispensary of the Salvation Army are in large measure devoted to community dental service. At the Boston Dispensary clinic, for instance, about half the 30 patients treated during the day are children brought by the school nurses. An evening clinic is also open, primarily for adults, which charges fees that for the year

1920 enabled it almost to meet expenses. At the Maverick Dispensary the work is also confined almost entirely to children, largely brought by school nurses of the district. At the Roxbury Dispensary 75 per cent are children and half the clinic time is reserved exclusively for school children brought by school nurses. The District Nursing Association of Boston, in connection with its Health Center in the Hyde Park district, conducted for a year an experiment along the lines of the Bridgeport dental plan to be described hereafter. This included two dental hygienists in the neighboring public schools, and a dentist in the clinic at the Health Center. It was hoped that the School Committee of Boston would continue this experiment, but it did not do so. The clinic, however, has been continued by the Association. The Lincoln House Settlement has maintained its dental clinic primarily for community purposes, and again its patients are three-fourths children.

Need for dental work has been fully recognized in Boston, and great pressure has been felt by all the clinics as well as by the two dental school infirmaries. The hospital clinics at the Massachusetts General Hospital, Homeopathic Hospital, Children's Hospital and Carney Hospital have as above mentioned, all found it necessary, as stated above, to limit their work to patients already cared for by the hospital for other reasons. For fillings, for instance, the Massachusetts General refers patients to the dental school. Out of nearly 28,000 new patients cared for in the Massachusetts General Hospital out-patient department in 1918, the dental clinic cared for only 308 new patients, or a little more than one per cent. These were referred cases, selected for special reasons. The Children's Hospital dental program is more extensive, and aims to

cover a large proportion of the patients, the plan being to give every child a thorough dental examination before discharge. Cooperation has been arranged by the Children's Hospital with the Harvard Dental School for orthodontic work.

It is apparent that these hospital and dispensary dental clinics in Boston show a considerable measure of community interest, and that efforts have been made to develop community relations through cooperation as well as by accepting patients who most need the service, and whose care is particularly desired by related community agencies. The two dental schools have been placed under great pressure, and have been unable to meet the demands.

There are no school dental clinics in Boston. Examinations of the teeth are made by the school physicians and as many children requiring dental treatment as can be accommodated are taken by the school nurses to the various clinics of the city. The majority are received by the Forsyth Dental Infirmary, which this year has limited its admissions during the school year to Boston school children of the first three grades. All the other clinics reserve special hours for groups of school children.

The superintendent of schools says that the appropriation (\$150,000 to \$200,000 yearly) for health work in the schools is specifically for inspection and not for treatment, and Boston is not yet ready to endorse medical treatment by schools. The medical inspection department is controlled by the School Committee, and is not connected with the Department of Health.

In 1920, 105,193 children were examined by school physicians, who reported 45,567 with defective teeth. There were 42,700 reported to the school nurses for treatment. There were 15,806 treated by private dentists,

and 16,178 at dental clinics. The nurses escorted to clinics 10,923 for the first time and 20,923 for revisits.

In 1920, the physicians reported 14,015 cases of hypertrophied tonsils. The nurses reported 2,363 operations upon tonsils, and 2,259 upon adenoids.

A few lectures on dental hygiene are given in the schools, 15 in 1919 and "several" in 1920. Toothbrushes and tooth powder are sold at cost by the school nurses. The school nurses aim to visit each class once a month for a toothbrush drill, and are instructed to inspect the teeth of all children in all grades once a month. The Forsyth Dental Infirmary awards certificates to class rooms in which the entire class has had all necessary dental work done.

There have been no reports as yet made regarding the effect of dental treatment upon school attendance and upon the diminution of contagious diseases, but it is stated that a survey is soon to be made of certain schools in Boston and that statistics will then be kept currently.

It is to be noted that there is no inspection by dentists of school children's teeth in Boston, the examinations being made by the school physicians. It is somewhat characteristic of New England tradition that the public schools of the city of Boston have depended upon private funds for the dental treatment of school children.

The Forsyth Infirmary. Since 1915 Boston school children have had the advantages of the Forsyth Dental Infirmary, which may now be described. The Infirmary is an independent endowed institution located about two miles from the business center of the city, on a fine site near the Fenway. The building is of white marble, constructed as a memorial. The present value of the investment, including building and equipment, is stated by

Dr. Harold De Witt Cross, the superintendent, to be approximately \$800,000. It was founded by John H. and Thomas F. Forsyth in 1910, and was opened in 1915. A Board of Trustees is the governing authority, five of whom are business men, four dentists, and two physicians. It is quite near the Tufts Medical and Dental Schools and a little over half a mile from Harvard Medical and Dental Schools. There is no organized relationship with the public schools nor with any community agency. The trustees include certain persons who are officially interested in the Harvard Medical and Dental Schools and others similarly interested in Tufts, but the relationship is not of an official character in either case. It receives children under sixteen for all forms of dentistry (except prosthetic work, for which patients are referred to the dental colleges). Tonsil and adenoid operations are performed when required in dental cases. The Institution also conducts research, public education through lectures, instruction for graduate dentists, a School of Orthodontia, and a Training School for Dental Hygienists.

There are two wards with ten beds each. A charge of \$1 a night is made but free cases are accepted, and the average amount collected is 25 to 30 cents. Last year 770 tonsil and adenoid operations were done and 35 surgical cases were treated. At the second visit every child is given a nose and throat examination; 5,407 examinations were made in 1920.

There are 65 chairs, but only eighteen dentists are on the regular staff at the present time. About twenty chairs are used by student dental hygienists for cleaning. The clinic is in operation seven hours a day, with a half day on Saturday. Children of any age up to sixteen years from the neighborhood of Boston were at first received, but

this year admissions have been limited to school children of Boston from the first three grades. The aim is to get children as young as possible, and the average age of patients has been reduced to seven years. Children are kept thirty-five minutes in the chair and average three visits a year.

Only children from families where the per capita income is \$6 or less are received. The statement of the school nurse is accepted, subject to scrutiny by the registrar. Five cents a visit is the only charge and a few free cases are received. School nurses from all parts of the city have regular assignments for one or two sessions a week.

Emergency cases of suffering are received for one treatment and put upon the waiting list to be seen on Saturdays, when the school nurses do not have appointments, and during the summer months. By summer, in addition to several hundred who have received one emergency treatment, there are usually 1,200 on the waiting list.

The total number of cases treated in 1920 was 22,652, of which 13,687 were new cases; 8,965 were returned cases; and 8,801 were emergency cases. The daily average of dental patients was 169. The total visits were 45,686. The number of prophylactic treatments given by student dental hygienists was 30,945.

Every child before receiving treatment is sent to the Oral Hygiene Department for a talk by a student hygienist on oral and personal hygiene. The child then receives a prophylactic treatment from a student.

The educational work of the Infirmary includes the utilization of students from the dental colleges, and also the Training School for Dental Hygienists, which was conducted for three years by the Infirmary alone, and in 1919 became affiliated with Tufts Dental School. Ninety-

nine students have been graduated, and there are 42 in this year's class. The course covers a period of twelve months. The time is apportioned as follows:

Lectures and Quizzes	260 hours
Laboratory	200 "
Prophylactic Clinic	880 "
Special Clinics	268 "
Registration and Oral Hygiene	250 "

The School of Orthodontia is a post-graduate course conducted since 1919 in cooperation with the Harvard Dental School. It has the use of a clinic with three chairs. In 1920, there were two students; 35 cases were under treatment and received 1,103 treatments. This year there are three students.

A nutrition clinic was started about a year ago for 25 selected operative cases, with a dentist for follow-up. This method has been begun lately with the younger children. A medical staff has been built up, including pediatricians, a neurologist, an orthopedist, and others. It will be noted that the Forsyth Infirmary is not integrally associated with a medical school or a general hospital. It has proceeded to develop the medical relationships of dentistry along independent lines.

The staff consists of a Supervisor on full-time, paid \$2,500, with an Assistant Supervisor on half-time, paid \$1,500, and eighteen operators on full-time at a salary of \$1,000 a year and with the privileges of whatever instruction the institution offers and of training in preventive dentistry for children. Some service is received from visiting dentists, but this has not been found dependable.

The gross expense of the Forsyth Dental Infirmary in 1920 was \$90,000. Omitting research, the total expense of the dental work was \$80,343, of which departmental

expenses were given as \$39,051, and overhead as \$41,292. If the entire 65 chairs were in actual use, the departmental expense would of course be larger, and the overhead slightly higher. It is estimated that if the 65 chairs were all in use, the total dental expenses would be about \$115,000 or an average cost of about \$1,800 per year per chair. As a matter of fact, with post-war difficulties and other conditions causing only 18 chairs to be in operation, the average cost per chair for the year 1920, on this basis, was \$4,463. These figures (\$1,800 and \$4,463) do not include expenses for research, tonsil and adenoid work, or orthodontia, but do include expenses for the dental service proper,—prophylaxis, fillings, etc., extractions, and X-ray.

In 1920 there were 45,686 visits made to the Infirmary for dental purposes (excluding extractions, X-ray, orthodontia, oral surgery, etc.). Including the appropriate charge for overhead, the estimated cost per visit was \$1.55. Excluding the overhead, and considering the expenses of the dental department only, without extractions, research, orthodontia and tonsil and adenoid work, the cost per visit was seventy-seven cents.

It will be observed that these unit costs are on the basis of a comparatively small amount of dental visits made to the Infirmary, which ran only to about one-third of its capacity as a dental clinic in 1920. A total of 150,000 visits, if all the dental units were in operation, would be approximately its full capacity. If this full capacity had been utilized, the cost of dental visits alone, including overhead, would have been \$115,000, or an average cost of seventy-six cents per visit, and without overhead, an average cost of fifty-six cents per visit.

The effect of the comparatively small number of dental

chairs in use in the Forsyth Infirmary upon increasing the unit cost is obvious. While the war undoubtedly increased the difficulty of securing dental operators and increased the expenses, the shortage of staff existed before the war. The Forsyth Infirmary has never been operated to its capacity. Considering the great demand for additional dental service, it is unfortunate that for lack of maintenance funds or for other reasons this valuable plant and equipment has never been able to operate to more than a fraction of its capacity. No financial statements have been published by the Infirmary. Probably the salaries paid the assistant dentists have been too low to secure a sufficient number of men, considering the general shortage of dentists, and the opportunities open in private practice or other salaried positions.

In the above cost estimates, no consideration has been given to the investment in plant and equipment. It is estimated that the present value of this is \$800,000 so that an interest charge of five per cent on this investment would be \$40,000 per year. About three-fourths of the total expense of the Infirmary is for the dental department. Thus the dental service represents an investment which would carry an interest charge, at five per cent, of \$30,000 a year, and which amounts to about \$10,000 per chair, if the total capacity were employed, or over \$30,000 per chair in use in 1920.

It may be urged that a monumental building, inviting literary description and attracting visitors from all over the country, possessed a certain distinctive value during the pioneer years of the dental hygiene movement. The establishment of the Forsyth Infirmary, in fact, proved to be an important stimulus towards the movement which of recent years has spread so rapidly throughout the

country for the education of the public in the need of adequate care of the teeth of children. While the establishment of a monumental structure without sufficient funds for annual maintenance should set no precedent for other communities, the Forsyth Infirmary is justly entitled to the credit which it has received from the general public and from the dental profession as a pioneer in its field. Since it represents the largest benefaction thus far made to general dentistry, it must also be considered a shining example of the recognition by benevolent laymen of the value of dental service as an asset for the public good.

The Boston System as a Whole. The relationships between the different agencies giving dental service in Boston may now be considered as a whole. The outstanding element is the Forsyth Dental Infirmary, centralizing the prophylactic, reparative, operative, and other dental work for the children of the city. The results achieved must be considered in relation to (1) the efficiency of the service rendered; (2) to the number of children and (under another category) the adults cared for in proportion to those who need care; and (3) finally the expense of the system in relation to results.

From the standpoint of technical efficiency, the work of the Forsyth Dental Infirmary and of other dental clinics in Boston appears in general to be of high grade. It is interesting that despite a large variety of comment unfavorably directed towards certain elements of the Boston system, which will be mentioned later, there has been practically no criticism of the treatment of patients in the clinics themselves.

So far as ability to cope with the bulk of the dental problem is concerned, it is obvious from figures already given that the Forsyth Dental Infirmary is now running

to only a small proportion of capacity and has found it necessary to limit its work to a small part of the school children of younger years. If a limit must be applied, the limitation to early years in school is a desirable policy. The system, however, of centralizing the work for the school children at a single institution for a city of three-fourths of a million persons has evidently broken down. Even if the Forsyth Dental Infirmary were run to its capacity in the dental department, three times the amount of work now done would be much less than the prophylactic and reparative work demanded by the children in the public and parochial schools.

Transportation is one of the most difficult problems in the Boston situation. Dental prophylaxis for children requires that each child should come to the dentist twice a year as a routine, and sometimes more frequently. All children need this treatment, and only a very few receive routine prophylactic care through private dentists, so this demand may be regarded as applying to almost one hundred per cent of the child population. In Boston this would mean more than 200,000 children between the ages of two and fifteen, or over 100,000 children attending the public and parochial schools. The children of school age alone would need 200,000 prophylactic visits a year, whereas the capacity of the Forsyth Infirmary is only 150,000, and the visits last year in the dental department were only 45,000 (this number including visits for more than prophylaxis).

At present the time of the school nurses in Boston must be spent in escorting children to the Forsyth Infirmary from all parts of the city. For instance, a school nurse in Jamaica Plain, an outlying section of the city, has a district with a school population of about 18,000. She

devotes one day a week to escorting children to the dental clinic. She does not attempt to take children from the kindergarten or from the first grade, because it is too hard to take such young children on the cars.

A dentist writing in 1918 in "Oral Hygiene,"* estimated that transportation to the Forsyth Infirmary cost \$250 a year for each school nurse, or about \$8,000 for all the school nurses of Boston; and \$5,000 a year for the carfares paid for the children by their parents; that the time children lost from school, figured at the cost per year for the education of a child, mounted to about \$4,500 a year; and that the time lost to the city for the school nurses, on the basis of spending a day a week escorting pupils to the clinic was about \$6,000 a year. Without taking these figures too seriously, it is obvious that there is a very large waste of time and money, risk of exposure of children to infection in traveling, and that moreover, a very expensive central plant is used for prophylactic work which requires comparatively simple technical equipment.

It has already been brought out that the reaction of the community to this situation has been in part to fill up local clinics, of which Boston has rather an unusual number in comparison with other cities, with school children who should theoretically be treated at the Forsyth. Even if the Forsyth Dental Infirmary had been able to overcome the financial or other difficulties which have stood in the way of utilizing the plant to capacity, it is not believed that the Boston system could show adequate results in terms of number of children cared for and relative expense per child. The testimony gathered from persons connected

*Keyes, Frederick A., M.D. Mouth Hygiene in the Public Schools. *Oral Hygiene*, March, 1918.

with school children is to the effect that taking Forsyth and other clinics together, not more than half of the dental work needed for children is done, and this is regarded as an outside estimate. If dental clinics were more accessible to the schools, the dental work for school children would undoubtedly be greatly increased. Of approximately 100,000 children examined in one year, over 42,000 were reported to the school nurses for dental care, of whom about 16,000 were treated by private dentists and 16,000 were taken to dental clinics.

The Forsyth Infirmary and the two dental school clinics are in the same neighborhood, two miles from the business center of the city. Children coming from all sections of the city, except the one district lying beyond the location of these institutions, must make one or two changes of cars. The Finance Committee in a recent report* comments on the danger to health and the liability of accident in street car travel for young children and recommends an additional appropriation for the School Committee to provide transportation facilities. The school nurses cheerfully accept the conveying of groups of children twice a week and are eager to do so, because they feel strongly the benefits of dental care to the children. But they feel that it is a great strain on them. They are reluctant to take the younger children because it is so difficult to protect them from danger of accident or from getting lost; although it is now the aim of the clinics to get the children as soon as they enter school or earlier (at the age of two) if possible.

The testimony of social workers and public health nurses is that dental facilities are inadequate. The need

* Report of Finance Commission on Petition of School Committee to Increase its Appropriation Power \$1.05 per \$1,000—*City Record*, Vol. 12, No. 50, Dec. 11, 1920.

is felt more acutely for adults, for whom the problem of securing dental care is considered nearly hopeless. The nurses of the District Nursing Association of Boston say that to get dental care for their patients is their greatest problem, particularly acute in relation to pregnant women. The Baby Hygiene Association finds it impossible to give thorough attention to care of the teeth. The remoteness of the existing clinics from certain thickly populated districts is an almost unsurmountable obstacle in the case of many adults and of younger children.

Some consideration has been given in Boston to a motor bus service for children. The Guild of St. Appolonie has provided an auto bus for the children of the parochial schools, with a matron, which has been estimated to cost something like \$2,000 a year to maintain. The establishment of a motor bus system to transport children in general to the Forsyth Infirmary has been considered but no action has yet been taken. Even if this were established, it is clear that the Forsyth Infirmary, when run to its maximum capacity, could not do nearly all the work for Boston's children, and that additional clinics are necessary if a one hundred per cent job is to be done, or else the endeavor to centralize the prophylactic work should be abandoned in favor of something like the Rochester or the Bridgeport plan.

Cleveland. Cleveland has a population of 796,000, slightly more than that of Boston, but Cleveland with its immediate suburbs has a population of not much over a million, whereas greater Boston, as already mentioned, has about one million and a half. There are 550 dentists in Cleveland, or one to each 1,400 persons, approximately. A law permitting dental hygienists to practice in institutions under supervision of a licensed dentist is now being

sought. The contrast between Cleveland and Boston with respect to the ratio of dentists to population and as to the presence of dental hygienists is emphasized by a brief review of the limited facilities of Cleveland.

Two hospitals, The City Hospital and Mount Sinai, maintain each a dental chair, and Lakeside Hospital and St. Luke's are each about to establish a dental department.

The Board of Education maintains six school clinics, consisting each of a dentist with an assistant operating five days a week for three hours, during forty weeks of the year. Children are referred by the school medical inspectors and nurses. In 1919, the number of children treated was 4,421.

The Cleveland Mouth Hygiene Association conducts dental dispensaries in three of the health centers of the Division of Health. A dentist and an assistant operate in each for fifty weeks a year, five days a week, for three hours. The cost of these clinics is met from the Community Fund as a part of the Welfare Federation's budget.

Western Reserve University Dental School operates a clinic for all kinds of dental work. The charges are similar to those of private dentists practicing among working-class people; and they more than support the clinic. The school in its bulletin reports for the year 1918-1919 a total of 42,000 operations. In 1920 the enrollment was 161 students.

The Cleveland Hospital and Health Survey in its reports published in the autumn of 1920 calculated that the provision of dental service then in existence in the city amounted to a total of ten dental chairs, running a total of 156 hours a week.* It will be recalled that the Boston figures totalled 7,601. The three clinics run by the Mouth

*Cleveland Hospital and Health Survey. Part 8, Education and Practice in Medicine, Dentistry, Pharmacy, pp. 683-690.

Hygiene Association of Cleveland provide all the organized dental service available for 130,000 parochial school children, whereas it is estimated that eleven clinics operating eleven half-days a week are needed for these children alone. The public school children are even less well provided for. The dental care for persons of small means is limited to extractions and relief from acute conditions and is obviously most insufficient, even in this respect. The Hospital and Health Survey recommended a dental department in each hospital, and a dental clinic in each dispensary connected with a hospital, as well as in each of the eight health centers maintained by the Department of Health, instead of in only three as at present. The Survey also recommended that some of the dental clinics be pay clinics, charging fees covering the cost, as a provision for persons of moderate means.

It will be seen that in Cleveland the movement for dental hygiene and organized dental service in general has reached only a slight development. The very limited range of community service of the dental school infirmary is worthy of note. No relationship has been established between the dental school and other community resources for dental or medical care.

New York. The Boroughs of Manhattan and the Bronx have a population of approximately 3,080,000, and contain about 2,600 dentists, or one for every 1,200 persons.

In 1916, New York passed a law for licensing dental hygienists to practice in public institutions, schools, and offices of private dentists. Columbia University offers a nine months training course for dental hygienists, open to women 18 years or over, who have had four years of high school, or its equivalent. There are 26 students in the present class and 200 graduates.

A Directory of Dental Clinic and Dispensary Service was compiled in January, 1921, by the Health Service Department of the New York County Chapter of the Red Cross. There are 22 hospitals and dispensaries in New York that afford some form of dental out-patient service. In several places the work is limited to extraction, in several more to extractions and surgery. About one-third of these clinics are in operation one to three half days a week; 13 are open daily. The service in some dispensaries is confined to patients referred from other departments.

The hospital conditions can be illustrated by two among a number of examples. Bellevue and Allied Hospitals, maintained by the municipality, have a dental interne in each hospital whose primary duties are to examine and treat all children admitted to the hospital, and to relieve acute conditions in adults. They also treat children from the out-patient department. An extension of the service is desired by the authorities.

In the Presbyterian Hospital all ward patients have prophylactic treatment by a dental hygienist and an X-ray of the teeth. They are later given dental treatment in the dispensary, if they require it. A few patients are treated in the wards. Patients are not admitted directly to the dental service, but dental conditions are treated if they are complications of other troubles.

Other hospitals might be mentioned, such as Mount Sinai, which maintain a dental department, but limit their work to hospital patients and ambulatory cases referred for special reasons from medical departments of the same institution.

Three dental schools exist in Manhattan and the Bronx; Columbia University School of Dentistry, with 113 students in 1919-1920; The College of Dental and Oral

Surgery, with 511 students; and the New York College of Dentistry, with 573 students; a total of 1,207 in the three schools.

Manhattan and the Bronx contain fourteen privately supported dental clinics, maintained by social settlements, churches, the Red Cross, the Children's Aid Society, and other welfare organizations. A number of industrial concerns in New York have dental dispensaries for their employees, including large department stores, such as Bloomingdale's, Lord and Taylor, R. H. Macy and Company, James McCreery and Company, and John Wanamaker. The New York Telephone Company and the Metropolitan Life Insurance Company are two notable examples of industrial dental service, while at the Industrial Health Center of the International Ladies Garment Workers' Union a well equipped dental clinic is maintained.

The clinic of the Metropolitan Life Insurance Company is finely equipped and under competent direction. The work is entirely for adults and this should be borne in mind in comparing expenses with other clinics. The cost per case for prophylactic work alone was \$3.03 for 5,233 different employees. The cost per chair hour was \$2.35 for the prophylactic work alone. Most of the work in this clinic is prophylactic, but some emergency dentistry and some X-ray work is done. The cost per employee per annum for all branches of service was \$4.39 on the basis of the 6,191 employees to whom service was given. Of this cost per employee, the cost of prophylaxis alone was \$4.15.

This clinic was equipped in the year 1915, the cost of equipment being stated to be about \$1,000 per chair.

The figure of \$3.03 cost per case may be cautiously compared with the cost of prophylaxis shown in the carefully

worked out cost accounting of the University of California College of Dentistry. Their cost figures came to 47 cents for each prophylactic operation (cleaning of teeth). The difference is due to the fact that the work in the dental infirmary is done by students, so that there is no salary charge. At the Metropolitan Life Insurance Company Clinic, salaries constitute about four-fifths of the expense of the prophylactic work. Furthermore, "the case" in the Metropolitan statistics is not the same unit as the "operation" in the California figure. No definite conclusion can be drawn from this comparison, but it is made to point out the very large element of salary charge in prophylactic work, and the great saving that can be made by utilizing students so far as possible.

There are three school clinics in Manhattan and the Bronx which have been maintained by the Department of Health since January 1, 1913. There are in addition four school clinics in the Borough of Brooklyn and one in the Borough of Queens. Six are located in school houses, and two in buildings in the vicinity of schools. One dentist, with the assistance of a nurse, operates in each clinic for three and a half hours a day, six days a week. In Public School number 21, the services of a dental hygienist are provided by the Association for Improving the Condition of the Poor. The method of work is wholly prophylactic. Entering children are referred to the clinic for examination, the slight repair work necessary, and instruction in mouth hygiene. They are then required to report in six months.*

*The following figures give some idea of the amount of work done in the eight school clinics:

	1917	1918	1919
New Cases	8,069	7,116	6,689
Cases brought forward	3,675	3,698	4,313
Visits	21,503	18,306	16,942
Discharged cases	6,220	6,206	5,358

These services are obviously inadequate for New York. The eight school clinics of the Board of Health complete about 6,000 cases a year, among the 900,000 school children of the city. The aim is to extend it as soon as it is possible to obtain a sufficient appropriation to cover at least the children of kindergarten and the first two grades. Examination of the teeth is part of the medical inspection in the schools. Attempts are made to instruct the children in oral hygiene through talks and toothbrush drills, but the staff of school nurses is wholly insufficient for carrying out this plan.

The school nurses take children, as far as they are able, for dental treatment to the various dispensaries of the city. Only a small part of the required dental work in the schools is being done. There is need for care of the teeth of children who, when they apply for employment certificates, cannot pass the physical examination on account of dental disease. Some of these cases are taken at the school clinics on certain days.

Owing to the small number of clinics and the limited working force under the supervision of the Bureau of Child Hygiene, at the present time, the Bureau welcomes the co-operation of all citizens and agencies who are sufficiently interested in the care of school children to provide funds, not only for the equipment and maintenance of dental clinics, but also for providing the necessary number of dentists, nurses, and dental hygienists.

An appropriation for increasing the number of school dental clinics was included in the budget of the Department of Health for 1921, but was not approved by the Board of Estimate because of the extreme pressure for economy at the time the budget came up for action.

The Association for Improving the Condition of the Poor is now conducting a very interesting demonstration of thorough dental care for children of the kindergarden and the first five years of school. Its experiment was begun in January, 1920 with a five-year program. The district selected for the work has a population of 40,000, about 10,000 children of whom 6,000 are under the sixth grade. In this district are schools numbers 21 and 106, and a parochial school. There is a Children's Aid Society industrial school of 1,200, which has a dental clinic attended occasionally by a dentist for the worst cases. The Association employs a supervising dentist on part-time (salary \$150 a month) a full-time dentist (\$200 a month), and two dentists on half-time (\$100 to \$150 a month). They have three portable chairs which they use in School 106 and in the parochial school. In School 21 there is a dental clinic of the Board of Health. In each school the Association has put a dental hygienist. The three hygienists are paid at the rate of \$100—\$150 a month, two are on full time and one on half time. Fifteen students from the Columbia School of Oral Hygiene work in the Community House for ten weeks, three hours a day, caring for children from the schools sent by classes in charge of a teacher. They take 40 children a morning. The graduate hygienists take 160 to 175 children a month.

In the month of December, 1920, the amount of work done by the dentists (with one chair in use 6 hours a day, and two chairs 3 hours a day, and at irregular hours for extractions), was as follows:

Total cases	490
Fillings	615
Extractions	84
Treatments	78
Cleaning	483

This demonstration is not yet advanced far enough to show results, but the plan itself is noteworthy. It includes a well devised co-operative scheme related (1) to the school system (2) to an educational organization for training dental hygienists and dental students, and finally (3) to a definite population unit in a specified district. In other words, the plan is not merely to render service to a certain number of children, but to enable the dental results achieved to be measured in terms of total need for this particular group of child population.

The community house which is the center of this experiment has come into such relation to its neighborhood as to bring out dental needs for adults, and it is stated that a dental clinic for adults, probably of a self-supporting nature, is contemplated.

The value of such a thought-out demonstration is obvious. The amount of money invested in such a piece of work ought to yield much larger ultimate returns than if expended without such a plan. To demonstrate what would be required to do thorough dental work for children in a specified area may have great influence in leading the metropolis to finance a more adequate dental program.

Although the dental facilities of Manhattan and the Bronx seem so numerous, it is obvious they are totally inadequate for a population of 3,000,000 people. To secure dental care for adults is reported by the social agencies of the city to be an almost hopeless undertaking. The visiting nurses of the Henry Street Settlement find that it is almost impossible to secure dental attention for adults of limited means; all existing clinics are always filled to capacity. With regard to the children, the visiting nurses from all districts of the city feel that more dental

work is one of the most crying needs. Effort is made to meet a small part of the need by one expedient or another. In one district, for instance, two local dentists have been asked by the nurses to volunteer their services for the children, and they are taking ten children per week. At one of the health centers associated with this nursing service, the nurses and dietitians, although they needed assistance badly for their clerical work, wished instead to have the funds go to establish a dental clinic.

The testimony of the United Hebrew Charities furnishes a similar illustration: They have just had one of their nurses prepare a report on the dental facilities of her neighborhood house, which are very inadequate. This nurse succeeds in getting dental treatment for about nine persons in a month, whereas there are about 80 persons a month needing it in her district. Some dental care is required in almost every case of sickness. They make no systematic attempt to take care of the teeth of adults, as it is impossible to get treatment. The organization maintains a dental clinic; they provide equipment, and the patients pay three dollars an hour for the dentist's services.

The facilities in New York are furthermore not organized according to any general plan. The Health Department realizes that its eight school clinics only scratch the surface. Except for the carefully considered dental demonstration of the Association for Improving the Condition of the Poor, relations between the different medical, dental, education, and community agencies which should co-operate in a dental program are not worked out in New York to any degree worthy of mention.

Various Other Cities. An inquiry was made by letter to the Boards of Health and School Departments of the 46

cities mentioned in the foot-note.* These include all the larger cities in the United States and a few smaller ones. Forty-three of the 46 cities replied. Thirty of the 43 cities had dental clinics for school children. These are conducted under the auspices of the school department in 18 cities, and under the health department in twelve cities. All but nine of these had one or more clinics operated in school buildings. Dental hygienists are operating in the schools of five cities, namely, Bridgeport, Hartford, Waterbury, Rochester and New York. The number of school clinics varies within wide limits. Thus there are eight cities having one dental clinic for school children.

Three cities, St. Paul, Syracuse and Toledo have two clinics for school children; six cities have three each, Indianapolis, Springfield, Minneapolis, Cincinnati, Philadelphia, Milwaukee; two cities have four each, Baltimore and Washington; two cities have six each, Oakland and Jersey City; New York has eight and Pittsburgh has eleven school clinics. Chicago has six dentists operating in twelve schools; Bridgeport has three dentists, and Hartford four, for school dental work. Atlanta has several

*Ala., Birmingham	Mass., Boston	Ohio, Akron
Cal., Los Angeles	Springfield	Cincinnati
Oakland	Worcester	Cleveland
San Francisco	Mich., Detroit	Columbus
Conn., Bridgeport	Flint	Dayton
Hartford	Minn., Minneapolis	Toledo
Waterbury	St. Paul	Ore., Portland
Colo., Denver	Mo., Kansas City	Pa., Erie
D. C., Washington	St. Louis	Philadelphia
Ga., Atlanta	Nebr., Omaha	Pittsburgh
Ill., Chicago	N. J., Jersey City	R. I., Providence
Ind., Indianapolis	Newark	Va., Richmond
Ky., Louisville	N. Y., Buffalo	Wash., Seattle
La., New Orleans	Albany	Wis., Milwaukee
Md., Baltimore	New York	
	Rochester	
	Syracuse	

school clinics, and Kansas City is beginning to establish them. Detroit has sixteen clinics in schools and elsewhere, conducted by the Health Department. In Providence the Health Department furnishes dental inspection for school children and privately conducted clinics are used for treatment.

Philadelphia has three school dental clinics conducted by the Board of Public Education. Two dentists are in constant attendance and children of the surrounding schools are brought by the school nurses to these centers. Children are also taken to seven other dental dispensaries in the city by the school nurses. The Department of Public Health maintains ten branch dental dispensaries at various points in the city, employing nineteen assistant dentists and a chief. All services are free. The scope of the service includes prophylactic treatments, filling and extracting. In 1920, 9,646 patients were cared for and 75,343 operations performed.

In *Albany* the Board of Education has maintained a free dental dispensary for school children for seven years. One dentist is engaged for three half days a week during the school year and takes about 300 cases a year. The children received are certified by a school nurse for free treatment. About 4,000 children in the schools are in need of free treatment.

Omaha has a dental dispensary under the Board of Education, with one dentist on full time and one dental assistant, to care for needy children under sixteen. Cases are investigated and referred by the school nurses. The dispensary is open all the year and cares for between four and five thousand children.

St. Paul has a dental clinic for school children in the city physician's office and also two school clinics, one permanent

and one itinerant, both primarily for teaching dental hygiene with repair work as a secondary matter. The plan of the itinerant clinic is to stay in a building one month for prophylactic and educational work.

Minneapolis has the school dental clinics supported by the Board of Education under the directorship of the Commissioner of Health. The dentists work four hours a day for six days and are assisted by dental hygienists or nurses. Children are received who cannot pay for private dentists. A little orthodontia is done. A dentist is detailed when necessary for relief work in the special schools for the crippled, the blind and the retarded children.

In *Washington* the dental work of the schools is under the supervision of the Health Department. Four dental inspectors are employed. In 1920 they examined 14,314 children, finding 90 per cent with carious teeth and an average of 3.5 carious teeth per child. Four school dental clinics are conducted with eight operators on half time and four dental hygienists on full time. In 1920, 3,339 pupils (5.88 per cent of the pupils in the graded schools) were given treatment. The dental work is free to all pupils and each clinic has now a waiting list of about 1,000 pupils. The actual cost is estimated to be about one-third of the average cost of dental work elsewhere.

The City of *Flint*, Michigan, began dental work among school children three years ago with one dentist, under the auspices of the Health Department. The population of the city is 91,599 and the school population is about 16,000. The Health Department now employs five full time dentists. The work is administered from a central clinic in the Health Department, where there are also free medical clinics for school children not able to obtain private treatment. Other dental clinics are held in the schools or

nearby. The dental work is free to children most in need of treatment. 4,000 children a year can be cared for. Examination by a dentist of all children in the elementary schools is made once a year. Treatment is given first to children of the lower grades, and the aim is to extend it as far as possible to all the grammar grades. The Health Officer believes that the dental work has had a large influence upon the health of the children. What has been accomplished by this comparatively small city indicates how much can be done with strong local leadership which secures community backing for an adequate dental program. It will also be observed that Flint has a central clinic where dentistry has been associated with medicine, with other dental clinics held in schools or in association with them.

Detroit. The city of Detroit has a community plan for dental work, based thus far almost exclusively upon the school clinic. Detroit's population is about 990,000, and there are about 450 dentists, or one to 1,800 persons. The Health Department of Detroit maintains 16 clinics, nearly all of which are in school buildings. Three are located in hospitals. Part of the expense of maintenance of the hospital clinics is borne by the city and in at least one case the expense of installation was met also. In the central office of the Department of Health is a clinic with four chairs. This old office building was not constructed for clinic purposes, but the dental equipment is satisfactory. A few orthodontia cases are taken. The bulk of the work is prophylactic and reparative work for children. Some work for adults, is done in the central clinic but for emergency cases only.

The University of Michigan at Ann Arbor, forty miles from Detroit, plans a two year course for dental hygienists.

The first year includes the usual courses. The second year the student may undertake work which is expected to be for pay in a dental clinic or other Department of Health institution. The diploma will not be awarded until the end of the third year. The aim will be to keep students in institutional work rather than to let them go into private offices.

The school children of Detroit are inspected annually by both physicians and dentists. Dr. Henry F. Vaughan, Health Officer, states that 80 per cent of the children of both public and parochial schools are now examined annually. There are 55 medical inspectors on part-time, and 55 school nurses; but after July first they expect to have 45 additional school nurses. At present they are unable to cover all schools, but after July first they will be able to do so. The co-operation of the parochial schools is excellent.

Last year repair work was done for about 16,000 school children, and prophylactic work for about 12,000; but the number who receive prophylactic treatment is increasing rapidly, as more and more emphasis is annually laid upon this. Educational talks are also given in the schools. The policy is to stress prophylactic work for the younger children. Owing to the lack of hygienists, it has been impossible to do nearly as much of this work as is desired.

The appropriation for dental service by the Health Department was \$25,000 for the year 1921, which can be expended at the discretion of the Health Officer. Four full-time dentists are employed, paid at the rate of \$6 to \$10 a day, and ten or twelve are employed on part-time. There are three dental hygienists devoting themselves to prophylactic work, and one who is doing some educational and dental work in the schools. There is a supervising dentist on part-time, at a salary of \$1,800. Once a month

this supervisor holds a special clinic for his dental staff, and he visits the clinics while they are in operation. There is, however, no really adequate supervision of the field work. The records are on cards, and there is some mention of what was done for each case, but there are no mouth charts:

From the figures given it is obvious that the amount of work done for the children of Detroit meets only a small fraction of the need. The lack of a general well-equipped central dental institution deprives the supervising and operating staff of a source of coordination and a center of professional stimulation.

Bridgeport. Bridgeport, Connecticut, illustrates a city of small size, compared with Chicago, in which dental work has remarkably advanced, largely due as in Flint to the local leadership of one man. Dr. Alfred C. Fones, one of the leading dentists of the country, has made Bridgeport widely known for its development of dental prophylaxis for children.

The population of the city is about 148,000. The number of dentists in the city is about 100, or one to each 1,400 of the population. There are 26 dental hygienists working in the schools. Connecticut has as yet no school for dental hygienists. In 1913-1914 a training course was given in Bridgeport under the auspices of the Department of Health to prepare a number of hygienists for work about to be undertaken in the schools.

The Bridgeport Hospital has had a dental service for about twelve years. Until three years ago this consisted in caring for emergencies—acute and chronic infections and surgical cases. It has now been developed to the extent of dental examination of all patients in the wards, and treatment when required, as part of the routine care of the

patient. There is no dental out-patient clinic, the clinic conducted by the city being relied upon.

The Department of Health has maintained dental work for school children since 1914. Dental prophylaxis is carried on in 41 schools (parochial and public), with a population of 21,000 children. Three dentists and twenty-six dental hygienists are employed. The work of the dental hygienists includes prophylactic treatment, cleaning and polishing the teeth, toothbrush drills and classroom talks, stereopticon lectures to older children, and educational work among parents. The work of the dentists is confined to filling the first permanent molars for children in the first and second grades and extracting abscessed teeth for children of all grades.

In the year 1919-1920, 28,012 prophylactic treatments were given by the hygienists to 20,918 children; 889 children had teeth filled with a total of 2,443 molars filled; and 5,991 teeth were extracted.

The aim is to give two prophylactic treatments a year to children of the first and second grades. All children receive this treatment regardless of the parents' financial status, and are all eligible for the services of the dentists in filling first permanent molars and extracting abscessed teeth.

During the summer vacation, dental clinics are opened in various schools where children from the higher grades, including the high school, may receive a prophylactic treatment and instruction in dental hygiene. Nearly 3,000 children received treatment last summer.

A dental clinic in the Welfare Building is conducted by the Department of Health. It has four dental chairs with three dentists in attendance seven hours a day for five and a half days a week. A large majority of the patients are

children. In 1920 there were 1,038 new patients and 5,552 treatments. The cost of maintenance was \$6,268.82 for the year ending April 1, 1920, and the amount paid by patients was \$1,399.60. Only persons from families with a per capita income of not over \$7 a week are admitted.

It is well to know that in the Bridgeport clinic, a municipal undertaking, ten cents is charged for admission, and fees for services as follows:

Examination	\$0.10
Cleaning	0.25 to \$1.00
Filling	0.25 to 1.00
Extracting	0.25 to 0.35
Treating	0.25

The Forsyth clinic charges five cents for admission, and the same fee is asked at the Rochester Dental Dispensary.

It should be observed that in Bridgeport, practically the entire child population in public and parochial schools received prophylactic treatment last year, with an average of one and a half treatments per child. Moreover, tooth, brush drills and class room talks were given in 1920 to 22,587 children, which again is practically equivalent to the whole school population.

The cost of the work was \$45,913 for what was done in the school, parochial and public, and \$6,268.82 for the dental clinic in the Public Welfare Building, a total of \$52,181.82. Part of the work of the welfare clinic is for adults, the proportion of which could not be ascertained. Estimating roughly that the share of the expenses of the clinic chargeable to children's work was \$4,000, we would have a total cost for the children's service of about \$50,000, for a school population of \$22,000, or about \$2.27 per child per year. This is a lower figure than has been observed elsewhere, but as can be seen, no extensive reparative work for children is included.

Doctor Fones had laid great emphasis upon prophylaxis and upon instruction of children and their parents in the care of the mouth and in diet. He believes that "from seventy per cent to eighty per cent of dental caries can be eliminated through the public school system by the incorporation in the school curriculum of a definite health program, making hygiene one of the requisites for promotion. This would insure the cooperation and interest of the child, teacher, and parent." *

Substantial results are reported in the reduction of absences from school, as one of the probable results of the dental hygiene program. A reduction of the percentage of retarded pupils, in the incidence of contagious disease, and a reduction in the number of cavities found in the permanent teeth of children in the fifth grade are felt to be due to the intensive prophylactic campaign which Bridgeport has conducted since the organization of the dental system in 1915.

The report of the Division of Dental Hygiene for the year ending in 1920, of which Doctor Fones is Director, may be quoted in part:

"Previous to September, 1919, the school work was handled entirely by a traveling corps of hygienists with portable equipments. The corps remained in a school until the work was completed and then moved to the next school, returning at a later period. The interest in mouth hygiene in the intervals between the visits of the hygienists depended in a great measure upon the influence of teachers.

"In September, 1919, we placed a resident hygienist in certain schools and a comparison of the records with those of the traveling corps indicates that this procedure would be ideal if sufficient hygienists could be secured. We intend this year to

*Quoted from Annual Report of the Division of Dental Hygiene, Department of Health, Bridgeport, Conn., 1920.

locate as many resident hygienists as can be spared from the traveling corps. A few of the many advantages of this plan are as follows: A reduction of the number of children with whom she comes in contact and works for, enables her to remember the mouths of individual children and to give special help in cases which need it. Her constant presence in the schools is a daily reminder of clean mouths and sound teeth to all the pupils and teachers in her school. She is able to carry through lively competition between rooms for the reward of clean teeth banners, honor rolls, etc. Her undivided interest in the children of one school brings her in touch with the parents, who are frequent visitors at her clinic.

"It is apparent that the improvement in any school depends materially upon cooperation of principals and teachers with the hygienists and our records will show how heartily this help has been given. The personal attitude of the teacher means so much to the child, and it is invariably true that the best records come from the room of the teacher who has an appreciation of mouth hygiene."

One danger in this program is the over-development of the work of the dental hygienist. The school dental program is part of the general health program for children, and what the school nurses and other medical and health workers need to do for these children should be considered as well as what the dental hygienist may do.

It may be noted that organized dental service for adults in Bridgeport is only slightly developed.

Rochester. Rochester, New York, has the most comprehensive plan for dental work for children in this country. The city had a population of 295,750 in the census of 1920, with 45,000 children in the public and parochial schools.

The center of its dental system is the Rochester Dental Dispensary, an institution founded by Mr. George Eastman, and governed by a board of directors. The

expense of the building and equipment is said to have been approximately \$450,000. An endowment of \$750,000 was also provided by Mr. Eastman, and has since been increased to \$1,800,000. Mr. Eastman made it a condition of his initial foundation that twelve leading business men of Rochester should become members of the board of directors, and should each contribute \$1,000 a year for five years; and that the city should appropriate \$20,000 annually for a similar period to pay for prophylactic work for children in the schools, and in institutions such as orphan asylums. The Dispensary is in no way under control of the city government, but is entirely in the hands of its board of directors.

The location of the building is not far from the business center of the city, and is convenient to car lines. The building is attractive but not of the monumental character of the Forsyth Dental Infirmary. There are 37 chairs in all, 28 in the dental departments, 2 for extractions, and 2 for orthodontia. There is space, however, for adding 31 additional chairs. The surgical department has 18 beds for oral surgery and tonsil and adenoid operations.

The Dispensary is in operation all day. Children up to sixteen years are accepted. There are 23 dental operators on the staff, and a supervisory staff.

At present there is no research department, such as is maintained at the Forsyth Dental Infirmary. The foundation of the medical and dental school of the University of Rochester, now assured through contributions of the General Education Board and of Mr. Eastman, will establish a great medical and dental center with which the Dental Dispensary will be affiliated, and which will provide relationships with medical education, with research, and with a general hospital and dispensary, upon

the importance of which so much stress has been laid in this report.

A five cent admission fee is charged but is not always collected; only those children are admitted whose family income is as follows: not more than

\$20	a week for 2 in the family
\$27	" " " 3 " " "
\$32	" " " 4 " " "
\$	7 a person a week for 5 or more in the family.

The statements of school nurses regarding income are accepted. In other cases, the applicant's statements are checked up by letters of inquiry sent to employers.

The statistics of work done in the Rochester Dental Dispensary are given in its Annual Reports, together with the receipts and disbursements. Among the significant figures are the number of visits to the Dispensary, which was in 1919, 48,813 and 46,911 in 1920. The decrease is attributed to enlargement of the tonsil and adenoid clinic during the summer of 1920, when many children received surgical operations who would otherwise have been dental patients. The number of treatments however, is larger by 4,000 in 1920 than in 1919. The number of extractions is also larger. The prophylactic treatments in the schools were 66,953 in 1919 and 63,528 in 1920.

The cost per visit during the year 1920 was \$1.42. The cost of the dental department, making an allowance for overhead, was about \$1,500 per chair. The figures may be compared with the Forsyth Infirmary, although caution must be exercised in drawing deductions from such comparisons. It will be remembered that prophylactic cleanings are done at the Forsyth, but not to any large extent at the Rochester Dispensary. This would tend to increase rather than to decrease the unit cost in the Rochester institution.

In the orthodontia department 150 cases were under treatment in 1920, involving 4,155 treatments. Seven chairs are used for orthodontia. The work is under the direction of an experienced supervisor. It is hoped soon to double the number of cases carried.

The Rochester Dental Dispensary is closely linked with the community. Rochester has no school dental clinics for reparative dentistry. The plan is that reparative work of all kinds for children whose parents cannot afford a private dentist shall be done at the Rochester Dental Dispensary, the children being taken there by school nurses; but that all prophylactic cleaning shall be done in the schools themselves by dental hygienists working under supervision of dentists of the Dental Dispensary staff.

Squads are arranged as follows: two of 8 or 9 members each, who are graduate hygienists, with a supervising dentist for each squad; four squads of 12 or 15 members who are student hygienists, each having also a supervising dentist. All schools and orphan asylums are visited twice a year. Twenty-five to 30 children a day are treated by each hygienist. The average cost per cleaning is 40 cents. The present staff of dental hygienists is not sufficient to give prophylactic treatments twice a year to all the children. In 1920, the number of treatments in the schools was 63,528, about 70 per cent of the whole number required for 47,000 children. The chief obstacle in carrying out the plan completely is the lack of a sufficient number of school nurses to see that children needing dental work are taken to the Dispensary, and to persuade parents to take their children to private dentists.

The Dispensary maintains a school for dental hygienists which graduated its first class of 38 members in 1917. The present class includes 58 students. There have been 159

graduates. The course covers one academic year, one year of high-school being required for admission. It is these students who go to the schools as members of the squads just referred to, as part of their training.

Aside from the Rochester Dispensary there are a few other dental facilities in Rochester. The Homeopathic Hospital has one dental chair for its patients, and a dentist takes four or five adult patients a morning for extractions. The Hahnemann Hospital has a dental department with a visiting member of the staff and dental service for patients who require it. The Rochester General Hospital has a dental clinic in its dispensary two evenings a week, which also does prophylactic and emergency work for child patients in the wards. An average of 20 patients a month are treated. The dispensary of the Social Settlement on Baden Street has one dental chair for adults only, with two dentists on half-time. This clinic has been in operation about a year. An evening clinic is held one day a week, an evening being substituted for one afternoon. In 1919-1920 there were 673 visits. Charges are for materials only—50 cents is paid for an appointment and deducted from the cost of the materials.

It will be seen that the clinic facilities for adults are extremely limited, being hardly more than a one-chair clinic in the Social Settlement and a little service for adults in some of the hospital clinics.

The Rochester Dental Dispensary, however, plans to open a dental clinic for adults, so soon as a sufficient number of internes can be obtained. It has definitely announced this intention in its report, and included the necessary items in its budget for 1921.

Persons connected with the charitable, welfare, and educational agencies of Rochester express only apprecia-

tion and satisfaction with the service for children given by the Dental Dispensary. The distance from some sections of the city is a difficulty in the minds of some, the escorting of children being regarded as a strain upon the school nurses. However the transportation problem is limited to the children needing reparative work, who constitute, it must be remembered, only a certain proportion of the total number of children, and as appeared in the preceding figures, the prophylactic service reaches practically the whole child population in the schools.

The plan combines the advantages of the Bridgeport system, which also reaches the whole school population for prophylactic purposes, with the benefits of a well equipped centralized clinic doing reparative work, orthodontia, and surgery and supervising the field work in prophylaxis. A very marked contrast is apparent in the testimony received from agencies in Boston and that obtained from similar sources in Rochester. There is some feeling among responsible heads of educational and health organizations in Rochester that branch clinics for dental treatment in the schools would be desirable, as a supplement to the central dispensary, in some distant sections of the city.

It will be noted that the total cost of the central Dispensary plus the prophylaxis in the schools was \$115,000 in 1920, for a child population of approximately 47,000. About \$24,000 of this amount, however, was for surgical work, nearly all on tonsils and adenoids. Deducting this, there remains a cost of \$92,000 or slightly less than \$2 per child, for a fairly complete program of service to a school population about one-ninth the size of Chicago. When dental student service is available after the opening of the new medical and dental school, this cost can be substantially reduced and the work enlarged.

The centralized supervision of the dental work in the schools brought about through affiliation with the Rochester Dental Dispensary is one of the distinctive features of the Rochester plan, which it is felt must exert a strong influence in maintaining a high quality in the prophylactic service. A system of school clinics without an affiliated central institution, such as in Detroit, suffers severely in contrast.

Chicago. The city of Chicago, with a population of over 2,700,000, has about 2,500 dentists, one for every 1,200 persons. A law to permit dental hygienists to be licensed to practice in schools and public institutions is now urged. Provision for hygienists to practice in the offices of private dentists has been omitted in framing this law, in order to conserve the available supply of dental hygienists for public health work.

A number of hospitals have a consulting dental surgeon on their staff for consultation and operation. Several hospitals are planning a complete dental service with both diagnostic and therapeutic functions. The dental clinic of the Michael Reese Dispensary is the only example at present of a dental clinic for general service associated with a hospital.

The Board of Health maintains dental service in several dispensaries of the Municipal Tuberculosis Sanitarium, treating their tuberculosis patients, although a few children who are not patients are received for emergency dental treatment. In the stockyards district, the United Charities installed a dental clinic in a neighborhood center because the need there for dental work was so pressing. The dentist's salary is now paid by the Board of Health.

School dental clinics were started in 1910 by private subscription, and with volunteer dental service. In 1914,

the Board of Health took them under control, and supported six clinics, while eight more were supported by Mr. Julius Rosenwald. This private support was withdrawn in 1921, and at present the Board of Health maintains six dentists, who operate in twelve schools, each being a center for a district. There is no systematic dental inspection of the children, although their teeth are examined as part of the inspection by the school physicians. The school nurses are expected to inquire into the ability of parents to pay for private dental care, and to see that children receive treatment in a clinic if necessary. The clinics of the dental colleges are also used. At the Illinois University Dental Infirmary a third of the children received are brought by school nurses, and about one-fourth of all patients are children. There are not enough school nurses to attend to getting the dental work done for the children, even if there were dental facilities available; but the existing facilities do not begin to meet the need. There is always a long waiting list in every clinic, and patients must be turned away. The six school dentists cannot care for more than 6,000 children a year, or not over one per cent of the children of Chicago.

Attempts at instruction in oral hygiene are made in the schools, through lectures, literature, and toothbrush drills, but there is no thorough or systematic plan.

The neglected condition of the school children's teeth is conspicuous in the Bureau of Compulsory Education. When children apply for work certificates, they are required to have medical attention for physical defects before the certificate is granted allowing them to go to work. But because it is impossible for most of the children to get the necessary dental work done with the few dental facilities that exist, the Bureau cannot require the cor-

rection of dental defects. Upon change of job, when the child has presumably earned enough to pay a private dentist, the certificate is withheld in cases of serious condition until arrangements for treatment have been made. Last year 693 children were held up for dental defects representing only the very serious troubles.

There are three dental college clinics,—at Northwestern University, Illinois University, and the Chicago College of Dental Surgery, a privately owned school. Altogether they care for between 15,000 and 20,000 patients a year. Last year Northwestern received over 9,000 patients and turned away 6,000. Patients from all sections of the city go to all three of these clinics without regard to convenience of location.

The number of students at these three dental colleges for the year 1919-1920 was as follows:

Northwestern University Dental School . . .	447
Illinois University Dental School . . .	194
Chicago College of Dental Surgery . . .	416
Total	1,057

The feeling among public health workers with regard to the existing dental facilities of Chicago is that they are almost zero in relation to the need. The Visiting Nurse Association regards its dental work as a farce. In extreme cases of suffering, money is supplied for private dentistry. The director does not stimulate interest in dental care among the nurses because of the hopelessness of getting treatment. The urgency of the need for dental clinics for adults is felt especially in cases of young pregnant women. The Children's Aid Society finds it impossible to give its children proper dental care, and is now engaged in studying the problem. The Infant Welfare Society desires dental examinations and treatments for all

the children in its care, but cannot get the facilities. The United Charities do not pretend to give attention to the dental needs of their clients because of the impossibility of getting treatment. Only the most serious emergency cases get attention. It is a struggle to get even these cared for. In one district they were forced to organize volunteer service among local dentists. In another district, as above mentioned, they established a clinic, afterwards supported by the Board of Health.

It is evident that in Chicago the dental facilities now provided are far less than in many smaller cities; and in proportion to population the deficiencies are still more obvious.

The hospitals in Chicago are less advanced in their provision for dental facilities for their bed patients and for their out-patient departments than in New York. In comparison with Manhattan and the Bronx, the population of which is nearly the same as that of Chicago, few local clinics established by hospitals or under independent auspices. The three dental colleges of Chicago do a large amount of work, but nothing in comparison with the need, and of course only a very small fraction of their work is preventive.

Thus far there has been no definite plan for demonstrating dental needs by an intensive carefully worked-out experiment, such as that of the Association for the Improvement of the Conditions of the Poor in New York. It is difficult to believe that the general public of Chicago has yet been awakened to the need for dental care for children and to the utter inadequacy of the present facilities both for children and adults.

CHAPTER VI

TONSIL AND ADENOID WORK

Tonsil and adenoid work has been mentioned a number of times, particularly in connection with the dental facilities in various cities. The Forsyth Dental Infirmary and the Rochester Dental Dispensary have both organized departments for this service.

The close relation of adenoid growths and diseased tonsils to mouth development and to dental conditions is significant and well recognized, but it is no more significant and no better recognized than the relation of the tonsil and adenoid to medical problems such as cardiac disease and to the general development of children. The operation for the removal of diseased tonsils and adenoids was given a great impetus by the spread of medical school inspection throughout the country. The general and special hospitals which have provided facilities for this work have consequently been asked to assume a burden which in most communities they have not been able to bear. It is highly important not to regard tonsil and adenoid work as predominantly connected with the dental program. It is connected therewith, but its fundamental connection is with the broader program of child health.

From the standpoint of demand for tonsil and adenoid work, some curious contrasts have appeared in the course of this study. In Chicago, where dental facilities are so limited and the testimony of health, social, and charitable agencies was so strong with regard to this deficiency, very

little feeling of need for enlarged facilities for tonsil and adenoid work were expressed. No doubt a portion of the explanation for this lies in the fact that the need has not yet been adequately revealed through the development of dental and medical examinations. As a contrast may be mentioned the Borough of Manhattan, with dental facilities only slightly better than Chicago in proportion to population, where there is an active and acute demand for more facilities for tonsil and adenoid operations.

The demand for tonsil and adenoid operations, arising from medical inspection in the schools and from the specialists in throat work, has been reinforced by the pediatricians, as the latter have studied out the effect of diseased tonsils in producing systemic diseases or infections leading to symptoms in heart, joints, or elsewhere in the body. The dentists also have emphasized the connection of the tonsil and the adenoid with the general health of the child, as well as with dental conditions themselves. The demand for tonsil and adenoid operations has thus come from general as well as from special sources, and has brought pressure from many angles upon operative facilities of hospitals.

The tonsil operation is now taken much more seriously than formerly, as a surgical procedure. Only a few years ago it was common to remove tonsils in the out-patient clinic, and to send children home again within a short time after the operation, even when performed under general anesthesia. The experience in New York City is suggestive in this connection. As a result of the inadequate performance of many tonsil operations in dispensaries, and the difficulties and dangers attendant upon the return of patients to their homes shortly after the operation, the matter was taken up by the Public Health Committee of

the New York Academy of Medicine, the Associated Out-Patient Clinics, and the State Charities' Aid Association in 1913. The report of these bodies warned against performance of the tonsil operation without bed facilities. In April of the same year, the Section on Laryngology and Rhinology of the New York Academy of Medicine took a census of opinion among its members (the leading specialists in these branches in New York) and found that the large majority were of the belief that a tonsillectomy required bed care.

The Public Health Committee of the Academy of Medicine recommended in a public report the following:

"That all adenoid and tonsil operations on children should be done under general anesthesia.

"That hospitals which undertake these operations should keep the patients for a certain length of time after the operation.

"That school physicians and nurses should exercise more care in seeing that only proper cases for operation be referred to hospitals, and that the children carry out the instruction given."

These recommendations and pressure from other bodies have produced a very marked effect in New York in improving condition under which tonsillectomies are performed, and elsewhere in the country it is now generally recognized that at least over-night bed care is necessary in connection with this operation.

Considerable light has been shed on the problem of facilities for tonsil and adenoid work by a recent report of the Public Health Committee of the New York Academy of Medicine, just published in the "Medical Record" of May 14, 1921. In substance it is found that the results of the general examinations made in the schools of New York City by medical inspectors of the Department of Health show that between 10 per cent and 19 per cent of

the children examined have tonsil and adenoid defects, the large majority of which require surgical operation. These statistics are based on the children examined during the last ten years, ranging in number from 230,000 to 308,000 per year. About one-fourth of the school population is covered each year.

A recent canvass made by the Babies' Welfare Federation brings out the extent to which operative facilities are available in the New York hospitals. The total number of operations performed in 1920 is reported as approximately 47,000. This figure is greater by several thousand than the number of children suffering from enlarged tonsils and adenoids, as discovered in the annual school inspection. There are, of course, the pre-school children to be considered also. "On the basis of the 1920 census figures, there are 455,000 children from two to six years of age, of whom at least 15 per cent have tonsil and adenoid defects. If only one-fourth of the pre-school age cases should apply for treatment, the annual demand from this source would amount to over 15,000. In that event, the annual demand for surgical facilities of the type under consideration would be in excess of the available supply. If systematic follow-up effort, similar to that of the Health Department nurses, could be instituted, in connection with the pre-school age children, and if one-fourth of both the school and the pre-school age children needing treatment should apply, the annual demand for the first few years would be for 55,000 operations. Gradually as the pre-school age children who have had nose and throat defects attended to, enter school, fewer defects of that kind would be found on examination, and the demand eventually would resolve itself to the needs of the annual increment of child population. For the time being, however, and for a number of

years to come, the annual demand will remain about the same."*

It will be observed that in New York City the child population of the school and pre-school ages is about one and a half million, and that probably 15 per cent of these are believed to need tonsil and adenoid operations, or 225,000. The present facilities in New York City in the hospitals are apparently nearly equal to the effective demand, considering that out of the whole number of children needing the operation, only a certain proportion of the parents will apply for or consent to it.

The problem of the tonsil and adenoid work in New York is therefore the three-fold problem of (a) "catching up" with the cases not thus far operated on, (b), stimulating more parents whose children need the operation to apply for it or give their consent to it, and (c), organizing in the best way the facilities now available.

There are certain hospitals in New York at the present time which find their facilities for tonsil and adenoid work greatly overtaxed, and make appointments a long time in advance. This is an unfortunate procedure, as the proportion of appointments not kept always increases greatly when there is a period of a month or more between the time the arrangement is made and the date appointed for the operation.

The following summary of the conclusions of the New York study will be suggestive in this respect:

"1. The present annual demand for tonsil and adenoid operations can be estimated as over 55,000. The existing facilities when fully utilized can probably be made sufficient to meet this demand, but the number of operations performed in 1920 was 9,000 below the estimated demand.

*From "The Tonsil and Adenoid Situation in New York City," a report by the Public Health Committee of the New York Academy of Medicine. Medical Record, May 14, 1921.

"2. There is need for a regulatory system to secure a more uniform distribution of patients among the hospitals, and to reduce the excessively long waiting lists in some hospitals.

"3. The standards of operative procedure, as well as the care of children before and after a tonsillectomy, differ considerably in the several hospitals. There is a need of stimulating the institutions to an appreciation of the importance of a thorough physical examination of the patients before operation, as well as for more effective methods of instruction as to care to be taken after the patients leave the hospital.

"4. A longer period of pre- and post-operative care would reduce the number of cases which can be accommodated in hospitals, and an extension of facilities in certain directions or during certain periods of the year might, therefore, be required."*

In connection with the last point, a new hospital especially for tonsil work, with facilities for ten ward patients daily, has recently been established in New York, and some other additional beds of similar nature are contemplated. The suggestion is made that during the summer, when general hospital work is usually light, the number of beds for tonsil cases in certain hospitals be considerably increased, in order to help "catch up." The establishment of any large number of permanent beds for tonsil and adenoid work in New York is not recommended by the Public Health Committee. The problem is one of temporary increase and better organization of facilities, and better distribution of cases.

It is important to observe that this great amount of tonsil work in New York, amounting to 47,000 operations, or three per cent of the entire school and pre-school population, has been done in general or special hospitals scattered over the city, and not in connection with a special dental institution or a special dental program.

* From "The Tonsil and Adenoid Situation in New York City," a report by the Public Health Committee of the New York Academy of Medicine. Medical Record. May 14, 1921.

In Boston, only a relatively small number of tonsil and adenoid operations appear to have been performed unnuually in recent years. The total number of tonsil operations reported by the school authorities as performed during 1920 was 2,363. Of these, 770 were done at the Forsyth Infirmary. If 20 per cent of school children need the operation, the figure 2,363 is only about one-tenth of the number who need it in Boston. It is probable that the figure as reported is lower than the actual number of operations, but the true total is certainly far less than the total needed. There has been thus far no movement, initiated from dental or other sources, to arouse the community in this matter.

Another phase of the tonsil and adenoid problem and another method of dealing with it is illustrated by Rochester. Last summer (1920) the Rochester Dental Dispensary conducted an intensive tonsil and adenoid clinic during which 14,070 children were operated on during a period of seven weeks. The publicity given this clinic caused a large number of cases to apply for the operation who could not be received at that time. This with other considerations led the City Health Department to make a survey of the schools with a view to determining the total need for tonsil and adenoid work among the school children of Rochester.*

*It may be of technical interest to note that in this examination of children, the Rochester Department of Health classified them in five grades:

0. Tonsils and adenoids already out
1. Operation not needed
2. Moderate or probable need of operation, best to wait
3. Urgent need for operation
4. Need for operation very urgent

Classes 3 and 4 are those which are recommended for operation in the clinic, and which are mentioned as needing operation in the statistics cited in this report. A special report was issued by the Rochester Dental Dispensary describiing the summer tonsil clinic.

In three schools selected because the attendance was made up of children from varied social classes, the percentages of classes 3 and 4 together, as defined in the footnote on this page, were 44.9 per cent, 45.7 per cent, and 3.54 per cent respectively. It was found that in one of these schools, chiefly attended by children of well-to-do families, more than 41 per cent of the children had previously had tonsil and adenoid operations, and but 3.54 per cent. needed it. In another school in a poor neighborhood, only 13 per cent of the children had had the operation, and 44.9 per cent of them needed it. In a school made up of mixed classes, the percentage of children who had previously had the operation was midway, 34.3 per cent, and those needing it, 45.7 per cent.

Applying these percentages to the school population of Rochester, it was estimated that 27,000 children of 16 years or under needed the tonsil and adenoid operation. It is worth noting that the school inspections in Rochester led to recommending for tonsil or adenoid operation, over twice the percentage of school children who have usually been thus recommended in New York City. It is impossible to say to what extent this divergence is due, (1) to a real difference in the condition of the children in the two cities, or (2) to different medical standards, or (3) to psychological factors. The New York figures are closer to those usually reported elsewhere.

The number of children believed to need tonsillectomy was evidently far beyond the capacity of the few hospitals of Rochester, including the beds in the Rochester Dental Dispensary. The importance of "catching up" was forcibly brought out by this survey, and a clinic was therefore organized under the auspices of a committee of the four chief hospitals, supported financially by the

Community Chest of Rochester, for doing tonsil operations on a large scale for a temporary period. In the Convention Hall, which was loaned by the city, a temporary hospital was organized by this committee. The capacity was nearly 100 operations a day. It was estimated that about one-third of the 29,000 children needing the operation were of families whose parents could afford to pay for it at the usual private rates, and that the remaining two-thirds needed to have it done at the clinic free or for a nominal charge. The temporary clinic in the Convention Hall was supplemented by increased operative work in the hospitals. Altogether 100 to 120 operations were done a day for a considerable period, from January to April, 1921. The final results are not yet ready for publication at the time of preparation of this report, but it is reported that 9,900 operations in all have been performed. After a summer recess, the hospitals of the city will assume a permanent program for tonsil and adenoid operations for school children and also for children of the pre-school age.

Certain evident dangers are apparent in this public and dramatic method of dealing with a surgical procedure of this kind. Undue fear of the operation among the lay public or on the other hand an hysterical demand for it must both be avoided. This particular clinic in Rochester seems to have been carefully conceived and excellently worked out, with intelligent cooperation on the part of newspapers and other sources of public information, so as to create the right understanding on the part of the public and avoid these perils. Focusing general interest upon the tonsil and adenoid problem, through this campaign, has undoubtedly assisted materially in gaining the consent of parents to have their children undergo the operation when recommended by medical authority. To

overcome parents' objections is under ordinary conditions a real and difficult problem in many cases.

In a larger community, however, it would be much less easy to concentrate the necessary degree of public attention upon a specialized campaign of this type, and to carry through the extensive organization necessary in a city five or ten times the size of Rochester. Considerations of this sort apparently led the Public Health Committee of the New York Academy of Medicine, after consideration of the Rochester experiment, to decide not to recommend an attempt of the kind in New York City. This judgment is believed wise, and it is believed the same judgment would apply to a city the size of Chicago.

Nevertheless, "catching up" is extremely important, and to do this, the hospitals must be stimulated, and where facilities are as limited as they are at present in Chicago for tonsil and adenoid operations, the development of special facilities, possibly of a temporary nature, might be advisable. The importance of this can be illustrated by the estimates made in Rochester that after they had once "caught up," the "annual crop" of children to be cared for would be somewhere between 3,000 and 6,000, or only between 10 and 20 per cent of the number of operations which were believed to be needed in Rochester in the early months of 1921.

These points are taken up later in the recommendations relating to Chicago.

CHAPTER VII

PRINCIPLES OF A COMMUNITY DENTAL PROGRAM

It is now desirable to summarize in general terms the conclusions which have been drawn from this study. Specific application to Chicago can then be made.

A. Dental Policy.

1. Dental care is essential to the maintenance of health and working efficiency.

2. The dental needs of any community taken as a whole are far beyond the reach of present and prospective facilities, both as to plant and to equipment, and as to dental personnel in either private or clinic practice.

3. Preventive dentistry is the only measure which offers hope for the future.

4. The primary application of preventive dentistry must be to children.

5. The test of any plan for children must be not only the number reached and the character of the results achieved for them, but the proportion reached in comparison with the total child population. The aim must be parallel to that of school education, which is to reach one hundred per cent of the children.

6. If selection has to be made because of limited facilities, with regard to work to be done, it is important that children of the younger years be reached.

7. If selection must be made in relation to kinds of service, general prophylaxis and hygienic instruction should come first. The hygienic instruction should include

13. As to the relation between the dental program and private dental practice, preventive dentistry cannot be expected to develop as an adjunct of private practice except for that small proportion of the population who have ample means. Preventive dentistry must be dealt with by public and semi-public facilities, in dental institutions or in local or school clinics.

14. Similarly, curative dental work for both adults and children cannot be handled by private practitioners for a large part of the population, who must be provided for by public or semi-public clinics.

15. Dental service in clinics should be salaried.

16. There is no reasonable ground for opposition on the part of private dental practitioners to the development of a preventive or reparative dental program, on a public or semi-public basis, since there is more work to be done than present and prospective dentists can possibly undertake.

17. Preventive and curative dentistry in dental institutions and in local clinics should be assisted by the present movements for closer affiliation of dentistry with medicine; for greater attention to preventive dentistry in training the dental student; and for the training of various technical assistants to the dentist.

18. The following financial policies are reasonable in the maintenance of organized dental service:

(a) Prophylactic work for children should be free and open to all children of school and pre-school ages on the same terms as is public education.

(b) With respect to the cost of this service, it should be borne in mind that the estimated cost of tooth cleaning and of instruction in mouth hygiene to children on a large scale is less than five per cent of the usual per capita cost of school education, and is a measure which will make more efficient the other ninety-five per cent expended.

(c) For dental care other than prophylaxis, a charge should be made in the clinic, including an admission fee and in addition charges for materials used for fillings, anesthesia, and other purposes; these fees being remitted when necessary.

(d) For adults, clinics should charge fees covering the cost of the service, but these should be remitted to persons seriously in need of the service and unable to pay for it.

(e) For children it is often essential to establish fees lower than the cost rates in order that the service may be sought by many of those who need it.

B. Relations to Education and Research.

19. Research into the conditions and causes of dental decay and into the methods of its prevention is of fundamental importance. The entire program of dentistry may be radically changed by future discoveries of specific causes of dental decay and agents of infection. Definite provision for research is supremely important in any program for a community large enough to support a dental institution of the first rank associated with medical and dental education.

20. In any community which has dental schools, the organized dental facilities in clinics and institutions should be affiliated with dental education. Every dental school must have its own or a closely affiliated clinic or infirmary for teaching students, and in addition, use should be made by students of dental facilities established primarily for community service, both for children and for adults. More attention to dental work for children is recognized by leading dentists as part of future dental education.

21. The teaching of dental hygienists should be an integral part of a community dental program in any community of size. The function of the dental hygienist will require study and possibly re-definition as time goes on, particularly with regard to the part to be played by the

hygienist, on the one hand, in technical assistance to the dentist in cleaning teeth, and on the other hand, as an instructor in mouth hygiene. It is desirable that the development of dental hygienists shall not interfere with the instructive functions of the school nurse. The school system cannot be expected to support a double set of health educators. Instruction in hygiene for school children must not be dealt with by a series of specialized instructors.

The education of all nurses and other public health workers should include more dental subject matter.

22. Dental service is needed by the general hospital as follows:

(a) For diagnostic purposes, in connection with medicine and many of its specialties.

(b) Routine dental examinations for all hospital patients are desirable.

(c) Dental care for patients whose medical conditions require it should be furnished or arranged for by every hospital.

(d) Development of dental therapeutic service beyond this point is a question to be decided by a hospital with regard to its means and the other dental facilities available in the community.

23. Dental service is a desirable part of every general dispensary, as follows:

(a) As a diagnostic service.

(b) As a therapeutic service for patients whose medical conditions require it, either furnished in the dispensary or arranged for elsewhere.

(c) Development of a general dental clinic should be carried out by every dispensary so far as its space and resources will permit. For children, the service should be work that supplements other facilities in the schools or in special dental institutions; for adults, the service should be along the lines outlined in No. 12.

(d) Clinics for adults should be made self-supporting so far as possible, and at least some should be held after the usual working hours.

C. Organization.

24. In a large city, a dental institution affiliated with dental and medical education and with a general hospital should be the center of the system.

25. The central institution should be the scientific and supervisory center of both prophylactic and curative dental service for the community, but the work actually done within its walls should be primarily for curative dentistry, dental research, and dental education.

26. Prophylactic and educational work for children should be decentralized, and should be done through local agencies, primarily the school system.

27. The prophylactic dental work in the schools should be under centralized professional supervision, the staff of the central institution (directly or through its branches) being the responsible supervisory body.

27-a. The benefits of localization of the prophylactic work for children should be both financial and educational.

(a) A substantial saving in cost of plant and equipment would be achieved by doing the cleaning of teeth in the schools where the building overhead is already carried, and where equipment, being solely for children's prophylaxis, can be of simple and relatively inexpensive character.

(b) A large saving in transportation expense, in incidental inconveniences, in danger to children, and in loss of time by escorts is achieved through decentralizing the prophylactic work, which should reach one-hundred per cent of the school population.

(c) Intimate local connection between the prophylactic work and the school system increases for children and parents alike the educational weight of the dental program; and links it more

closely with the general child health progress than is possible in any other way.

28. It is undesirable to centralize the curative work for the children in a community of over 250,000 population (unless a small congested area); but instead the central institution should be supplemented by branches, or by affiliated clinics attached to schools or hospitals.

29. The administration of the central institution and of its branches should be under an independent board. Affiliations with dental, medical, educational, public health, and hospital work, and with the city school system, may be in part achieved through appropriate members upon the board, but the board should be primarily a body interested in a community dental program, and not in special aspects thereof or in special institutions or agencies.

30. If branches are under the management of independent institutions (as for instance dental clinics in the out-patient departments of hospitals) there should be a formally understood working affiliation between the central institution and each branch, if the latter are to serve effectively as part of the community program.

31. The expenses of a community dental program are at the present time fairly to be divided between the community (city government) and private individuals such as the board of trustees of the dental institution and its financial supporters. The first charge upon the municipal interests is dental prophylaxis for children and given the right start, a steady increase in public readiness to assume financial obligations for the support of curative work for children and also certain services for adults should follow.

32. Financial economy and a gain in efficiency would result through the centralization of some phases of the dental educational program in a national organization.

This is particularly true of the preparation of literature, exhibits, and other informational and publicity material. A large number of local organizations are now spending much time and effort on such work. Much less than the amount of money that these local organizations are together spending would, if concentrated through one national center, enable a more expert publicity staff under the highest grade of professional guidance to produce better material, which would be accessible at minimum expense to an indefinite number of local agencies.

CHAPTER VIII

RECOMMENDATIONS FOR CHICAGO

It is well to summarize the dental needs of Chicago as a whole, and then to suggest the best procedure, since the entire program cannot be realized at once.

It is believed that dental service in Chicago should be developed under the following system:

- (1) A central institution, of approximately 60 chairs.
- (2) Four branches, approximately 30 chairs each.
- (3) School clinics (for curative work), located in outlying districts and supplementing the branches.
- (4) Dental prophylaxis and instruction in oral hygiene for all school children, to be done in the schools, according to the Rochester plan, by traveling squads of hygienists under centralized dental supervision.
- (5) The central institution to be under an independent board, but affiliated with medical and dental education and with a general hospital.
- (6) Dental research to be an integral part of the program, and provided for in the facilities of the central institution.

It will be seen that this general scheme follows in the main the Rochester plan of decentralizing the prophylactic work. Chicago is far too large to make it possible for any single dental institution of whatever size to fill the place for the community as a whole that the Rochester Dental Dispensary does in that much smaller community. Consequently four branches are recommended. It is not believed, however, that in a city which is so populous as Chicago and which covers so large an area, a central institution with four branches would be adequate for all

districts, and it is therefore recommended that curative clinics be located in certain school buildings, or possibly in some instances in other buildings, such as dispensaries adjacent to one or more schools. It is believed that locating such clinics in school buildings or in juxtaposition to them would be less expensive and better for the education of the community than an additional number of branches established as special dental institutions.

The characteristic development throughout the country in dental service is through school clinics, and while it is not believed that school clinics without a central institution are desirable in a community of large size, close connection between the dental system and the schools in curative as well as preventive work is strongly recommended.

It will be useful to sketch out certain details regarding this proposed plan. As regards the central institution, it is recommended that it should be affiliated with the dental school of the Northwestern University, and located if possible in immediate proximity to the new site of this institution, upon which a general hospital will also be located. The institution should provide facilities sufficient for all forms of dental work for children and adults, except such laboratory and clinical dental facilities for adults as may already be provided for adequately in the infirmary of the dental college itself.

A surgical department (with provision for oral surgery and for tonsil and adenoid work) should be included, unless it is possible to arrange that in the adjoining hospital adequate facilities of this sort shall be provided, with a working understanding between the hospital and the dental institution.

The affiliation of the dental institution should be such as

well secure the advantage of the medical staff of the adjoining hospital as consultants in relation to the dental service, and in return diagnostic and therapeutic dental services should be offered patients referred from the hospital and its staff.

It is strongly urged that a dental research laboratory be included in the institution, with adequate provision for the support of a research staff.

The training of dental hygienists as well as of dentists should be a function of this institution, in affiliation with the dental school.

It may be noted that the new location of the Northwestern University Dental School is not central for Chicago. It is, however, accessible to transportation lines. Affiliation with and proximity to an important medical and dental school is essential, and the only other practical choice is the new medical and dental school of the University of Illinois, which has the disadvantage of being an institution under state management, whose primary responsibilities are not to Chicago. It does not seem an appropriate center for an institution whose fundamental aim is a community dental program for the city.

The material and building should follow the comparatively simple plan of the Rochester Dental Dispensary rather than the monumental type represented by the Forsyth Infirmary.

The branch institutions need not include facilities for research or for orthodontia and surgery, nor dental laboratories.

It will be observed that the proposed plan would not displace any of the existing school clinics, although it might cause the relocation of some of them in districts which the central institution or the branches could not

so readily serve for curative work because of location. The school clinics would do only the simpler forms of reparative work, referring difficult cases either to the branches or to the central institutions; just as the branches in their turn would refer all orthodontia and surgery to the central institution.

The dental facilities of the central institution, so far as children are concerned, should be utilized after the general plan of the Rochester Dental Dispensary, in confining work definitely to children sent from the schools or from agencies dealing with the child of pre-school age. The area from which such children are accepted should be limited to definite boundaries, except that cases referred by dentists or medical agencies of a nature which would require the advantages only provided in this large central institution should be received there from any part of the city. The number of such cases, however, would from their nature be very limited.

The training of dental hygienists as well as dental students should be conducted in the central institution and in the branches, in affiliation with the dental school. The prophylactic work in the schools should be done according to the Rochester plan of sending dental hygienists, partly students and partly graduates, to the schools in squads, each with a supervising dentist responsible to the central institution staff. In Bridgeport, it will be recalled, a resident hygienist has been put in certain schools, and it is suggested that this scheme might be adopted as a supplement to the Rochester plan, particularly at some of the outlying schools, in which school clinics were located.

The facilities of the central institution and its branches should be opened to adults, and the clinics for adults should be made, so far as possible, self-supporting. There

should be a scale of fees, which when paid in full, would cover the cost, and which might be remitted in whole or in part to those who could pay only a little or who could pay nothing. It is advised that for children a fee of ten cents per visit be charged at the central institution and its branches, with remission of fee in individual cases recommended by suitable charitable or educational agencies, or at the discretion of the authorities of the institution.

It is urged that encouragement be given to the hospitals of the city to establish dental service or to develop it if already established, both for bed patients and for out-patients. It would be well to assist in the demonstration of the advantages of this by financial aid if necessary to selected hospitals to install adequate dental equipment and provide interne and visiting service to carry on an out-patient clinic of the type previously described.

Regarding tonsil and adenoid work, it is believed desirable not to establish large permanent facilities in special institutions for this service, but rather to encourage the general and special hospitals of the city to develop this branch of work in order to "catch up" with the existing needs of children for this operation. Of still more importance is a demonstration which will attract public attention to this need.

It is therefore proposed that the tonsil and adenoid clinic now in process of development in connection with the Michael Reese Hospital in the neighborhood of the Michael Reese Dispensary be definitely developed as a demonstration clinic serving the children of a defined area, by arrangement with neighboring public schools and with the Michael Reese Dispensary. This would require no change in the present plans for the plant of this clinic, but would render it essential that some one be placed in

supervision of the scheme who would be able to develop these community relationships, and to provide sufficient assistance to this person to enable the methods and results of the work, month by month and year by year, during the first two years, to be carefully studied out and presented. It is believed that this clinic would be rendered of much larger value to Chicago if the comparatively small additional outlay herein recommended is undertaken, in order to provide supervision and direction by someone who is especially interested in the area to be covered and who is familiar with community work.

It will be apparent from the previous discussion of units of dental service that if the prophylactic work were done in the schools, the facilities of the central institution would provide curative work for approximately 75,000 children a year. It is believed that besides the dental schools of Chicago, there are needed about 400 dental chairs for the children of the city, assuming the prophylactic work for children to be done in the schools. A complete program would include 60 chairs in the central institution, 120 chairs in four branches (taken together), some 60 chairs to be provided in dispensary clinics, chiefly those associated with hospitals,* and the remaining 160 chairs in the school clinics.

Since the heavy initial and maintenance expense of a complete program will prevent its establishment as a whole at one time, it is desirable to indicate the procedure that would best lead up to its ultimate establishment. It is recommended that in the beginning at least the following program be set under way:—

*These clinic chairs would only be used partly for children, and 60 chairs or more would simply be the equivalent of this amount of service for children distributed through a larger number of out-patient clinic chairs.

- (a) A central institution
- (b) One branch
- (c) Arrangements with dental clinics in schools for suitable relationship to the central institution and to the branch, so that in at least a certain part of the city the school clinic element as well as the institutional element will be represented.
- (d) Provision of prophylactic work for all the schools in a certain area, which should be either the area most accessible to the central institution or the area most accessible to the branch, or both such areas.

The 90 chairs in the central institution and one branch might be expected to serve 120,000 children, assuming the prophylaxis is done in the schools. This would be approximately one-fifth of the children of Chicago of the school and pre-school age. It would be a good policy to limit the curative work to children of the first four years in school, except for emergency dental service to older children, and to take in addition all pre-school children who could be brought through any agency. This would enable a somewhat larger area to be covered by the initial installation, without, however, covering so wide an area as to make the transportation difficulty a very serious one.

The proposed branch should be so located with reference to school clinics that an area would be created in which (1) the prophylactic work in the schools, and (2) the curative work in certain school clinics, the branch, and the central institution could function altogether as a complete demonstration, serving in an adequate way a substantial fraction of the children of Chicago. It is believed that not only would these children be greatly benefited, but that a convincing demonstration could be made which would lead to the expansion of the system by private benefaction and by increased municipal support.

As to expense, the central institution and its equipment

would probably cost \$700,000, and the branch probably not more than \$300,000, excluding the land cost in both cases. Proximity to the dental school and hospital would probably enable certain economies to be made in the central institution, by securing certain diagnostic and surgical facilities through affiliation rather than by separate provision.

The maintenance cost can best be estimated on the basis of the Rochester figures. For prophylaxis in the schools, the cost there is 40 cents per treatment, which would be 80 cents per child, with two treatments annually; the supervision being maintained centrally and a share of the work being done by student hygienists. For 120,000 children this would be \$96,000 a year. The city should bear a share of this from the first, and ultimately all of it.

The central institution, on the basis of the Rochester and other figures, would cost, excluding research and tonsil and adenoid work, \$1,750 per chair, or approximately \$105,000 a year, and the branch approximately \$55,000 a year. Clinics for adults, if maintained, as they should be, in the central institution and its branches, should not add to the net annual expense, since their overhead expenses would be already covered.

It is important to bear in mind that the cost of the central institution might be considerably reduced by the use of dental students.

If tonsil and adenoid work cannot be arranged for in the hospital near the central institution, 20 beds ought to be provided (a few of which would be used for oral surgery). The maintenance of these beds to capacity would cost about \$25,000 per year.

All of these costs are gross figures. It may be estimated that half the cost of tonsil and adenoid operations, if

carried on in the central institution, would be repaid by patients; and that at 10 cents a visit, with special fees for materials and other work, probably 20 per cent of the dental work for children would be paid for. The net annual maintenance, therefore, of the central institution and one branch, excluding the tonsil and adenoid work, would thus be \$130,000, —much less if a considerable amount of dental student service were available. The tonsil and adenoid work would add \$12,500. To this should be added \$3,500 for completing the Michael Reese experiment as above suggested. At least \$15,000 per year should be made available for research, either by endowment or by pledges secured for a period of not less than five years.

In summary form:

Estimated annual cost of proposed service	
Central institution	\$105,000
Branch	55,000
	<hr/>
	\$160,000 *
Less 20 per cent repaid by children	32,000
Net cost	<hr/>
	\$128,000
Net cost, tonsil and ade- noid work.	16,000
Research	15,000
	<hr/>
Total	\$159,000

The cost of the curative clinics in the schools should be borne by the city, as at present. At least half of the expense of the prophylactic work in the schools should be borne by the city from the first. A total of about \$200,000

* In Bridgeport, the expenses of the prophylactic and the curative work in the schools cannot be separated. Their total (including also the children's work in the central clinic) amounts to about \$2.27 per child. The gross cost for 120,000 children in Chicago as herein calculated amounts to \$2.15 per child, excluding tonsil and adenoid service and research, but it is assumed that some student hygienist service would be secured.

a year from private sources should maintain this program, and if dental students can be extensively used, this cost can be substantially reduced.

The Rochester Dental Dispensary has been endowed with \$1,800,000. Its original cost was less than \$500,000. A building expenditure of \$1,000,000 and an endowment of \$4,000,000 would be sufficient to provide Chicago with a central institution of a permanent nature, and a branch through which, given the necessary school affiliations, there could be demonstrated a complete plan for serving the entire population of the city, and which private and public interests would undoubtedly come to support.

This survey has brought out the wide contrasts between different cities in this country in their dental facilities, and has made clear that Chicago is far behind a number of other communities. It would be difficult to over-emphasize the importance and urgency of Chicago's need, or the influence of an adequate dental program in increasing the value of school education, improving the training of physicians, dentists, and assistants, and increasing the efficiency and promoting the health of the people of the whole city.

APPENDICES

APPENDIX A

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APPENDIX B

DENTAL CLINICS IN HOSPITALS AND DISPENSARIES

- (1) Dental service is an essential part of the work of a general hospital, as an element in complete diagnosis, and as a treatment need of many patients.
- (2) A dentist competent as a dental diagnostician should be recognized with adequate rank on the staff of the hospital, and should be given the necessary facilities, such as access to the X-ray and to beds when necessary.
- (3) The primary responsibility of the hospital in dental care is the dental diagnosis of patients whose mouth conditions are involved as a factor in the disease for which the hospital accepted these cases, and for whom dental treatment is necessary in order that the hospital's medical or surgical work shall attain satisfactory results. In other words, a hospital cannot carry out adequate diagnosis and treatment without undertaking dental diagnosis, and in some instances dental treatment also.

(4) A routine dental examination of hospital cases should be included as part of the physical examination.

(5) Hospitals maintaining out-patient departments should include a dental clinic for treatment purposes as part of this out-patient department, unless by some definite affiliation with another accessible dental clinic, the necessary dental care of its patients can be assured.

(6) The service of a dental clinic as part of the hospital out-patient department must ordinarily be limited in order to avoid over-crowding. Patients should be accepted for treatment in the following order:

a. Patients already received by the hospital or dispensary, whose mouth conditions are involved in a general medical or surgical condition which the hospital or dispensary has diagnosed, and for which it has assumed responsibility for treatment.

To give dental care to these patients, or to arrange for their care by definite reference and follow-up to some other institution is a responsibility which every hospital ought to meet.

b. Patients referred to the dental clinic from other medical or community agencies (such as a doctor or the visiting nursing organization) with the indication that the dental conditions are involved in the general condition of the patient.

c. Relief of pain and other emergency dental work for patients not otherwise connected with the hospital, but accepted merely as emergency cases.

d. Other patients accepted up to whatever number may be consistent with the facilities. So far as possible, this restriction should be on a district basis.

(7) Dental organization in the Hospital.

a. The dentist recognized as head of the dental service of the hospital should be in charge of the organization of its dental work, including the out-patient clinic.

b. Assistant dentists are desirable as visiting members of the staff of the dental clinic.

c. A dental interne is desirable, as a member of the staff of the hospital. His work cannot be confined primarily to assisting in the therapeutic work of the out-patient department, but he should be given opportunity to work in the diagnostic service with the chief of the hospital department, in order that his year of internship shall be a year of advanced dental education in both curative and diagnostic work. The supply of dental internes is inadequate, but the trend of dental education will stimulate young

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